Comparison of Fishery Products Packaging Methods

Abstract

The purpose of packaging is to contain the product, protect it from harm, serve as its identity, improve performance, protect from outside influences, promote the use and marketing of the product, increase consumer appeal, serve as a means of information and advertising, and make the product easier to use. Because of it's purpose and use of packaging, it is very important in the food processing industry. In general, packaging serves to protect the product from factors beyond its control that can accelerate the deterioration of the food it contains. In addition, packaging still has other equally important purposes, such as simplifying product distribution or control, and continues to play an important role as a means to disseminate information and promote the goods it contains.

Keywords: Fish Quality**, **Golding, Packaging Type

A. Introduction

Fish is a high protein partner. Due to the high level of national fisheries production and consumption, fish have a very large role in national food security. However, fish is a perishable component of food, lowering the quality and cost of the final product. The processing and packaging of fishery products must be balanced between Indonesia's high level of fish consumption and high level of fish farming production.

Product protection, convenience of storage, informational purposes, and consumer marketing are the goals of packaging. The packaging of fishery products is in line with the core principles of the concept of fisheries industrialization, namely increasing added value, efficiency, and competitiveness (bargaining position), where these three principles will be able to encourage the development of a conducive business climate in a country, including efforts to increase people's income and welfare.

A coordinated method of preparing commodities for transit, distribution, storage, sale, and use is known as packing, containerizing, or

packaging. The presence of containers or wrappers can help prevent or reduce damage, protect the products inside from the risk of pollution and physical interference, and protect them from the environment (friction, impact, vibration). A processed product or industrial product is also placed in packaging so that it has a form that facilitates storage, transportation, and distribution. Packaging containers serve as a stimulus or allure for customers in terms of promotion. Therefore, planning must consider the shape, color, and ornament of the packaging. Product marketing is closely related to good and attractive packaging. One thing that needs to be considered in food packaging is the selection of packaging materials that must be in accordance with the type of food itself.

B. Discussion

Packaging of Fishery Products

Packaging is intended to prevent spoilage, facilitate transportation, storage, quality control and make the product more attractive (Zaitsev et al., 1969).

Containers and wrappers play an important role in product storage. The presence of containers and wrappers can prevent or reduce the occurrence of physical and chemical damage. In general, containers and wrappers function to place processed products or industrial products so that they have a form that facilitates storage, transportation and distribution. Containers or wrappers can also provide protection against the quality of the products in it and protect materials against contamination from outside (Winarno and Laksmi, 1982)

In food packaging of two types of containers, namely the main container that is directly related to the product and the second container that is not related to the product. The main container must have non-toxic conditions, inert and waterproof container, can stabilize water and fat

content, can understand the ingress of odors and gases, protect the material against rays , resistant to pressure and impact and protects against contamination (Winarno, 1997).

The purpose of packaging is to contain the product, protect it from harm, serve as its identity, improve performance, protect from outside influences, promote the use and marketing of the product, increase consumer appeal, serve as a means of information and advertising, and make the product easier to use. Because of it's purpose and use of packaging, it is very important in the food processing industry. In general, packaging serves to protect the product from factors beyond its control that can accelerate the deterioration of the food it contains. In addition, packaging still has other equally important purposes, such as simplifying product distribution or control, and continues to play an important role as a means to disseminate information and promote the goods it contains.

Packaging materials should have six main functions (Syarief et al, 1989), namely:

1. Keeps food products clean and protective against dirt and other contamination
2. Protect food against physical damage, changes in moisture content and irradiation (light)
3. Has a good, efficient and economical function, especially during the process of placing food into packaging containers.
4. Has ease in opening or closing and also facilitates in the stages of handling, transportation and distribution
5. Have a size, shape, and weight that is in accordance with existing norms or standards, easy to dispose of and easy to shape or print.
6. Present clear identification, information and appearance in order to help with promotion and sales

For fishery production, the type of packer is selected according to the nature of the product, the storage time as well as the conditions required. The selection of good packaging can help fishery products maintain their durability in the desired storage conditions (Zaitsev et al. 1969).

Types of Packers

- **Cement paper**

  Paper bags were one of the first packaging that is still popular. While an envelope is a paper bag that has a special shape, it is very commonly used for mail wrapping. Both types of packaging are considered quite cheap in price and have a low weight ratio (the ratio between the weight of the container and the weight of the packaged product). If stronger packaging is desired, the bag can be laminated with other materials (Syarief et al. 1989)

  Paper consists of cellulose, hemicellulose, lignin, ecstatic substances and ash. Paper is generally made from pulp. Pulp is wood pulp obtained by processing wood mechanically (with a grinder) or chemically (with acids or bases). The next stage is that the pulp undergoes a process of refining, bleaching, internal sizing and filling, only then can it be formed into sheets of paper.

  Like envelopes, paper bags can be distinguished into several types including flat, quadrilateral, self-opening , open-mouth stitching, adhesive valves with sleeves and schoolbag model . Sometimes paper is widely used for foodstuffs such as sugar, ground coffee, various types of spices and various types of flour. Besides that, it is also used to package materials other than food or agricultural products such as cement, charcoal, textile dyes and so on. (Syarief et al., 1989).

  According to Mac Donald (1969) in Rahmatulloh (1988), cement paper is included in industrial paper because it is used for packaging industrial

products, such as for packaging food products. Cement paper has less water resistance when compared to superko paper because it does not have a wax layer mixed with plastic on its surface. This cement paper is widely circulated in the market and is usually used to package dry products.

The use of paper for raw materials for food wrapping bags can cause many problems. The first possibility is not guaranteed cleanliness (hygienic) of the paper. Another possibility is the presence of chemical elements or compounds that can be attached and even migrate from paper wrappers to food such as ink, pigments, preservatives, materials fillers and various other additives.

- **Polypropylene plastic**

  Polypropylene is a type of olefin plastic and is a polymer of propylene. This type was developed since 1950 under various trade names such as bexphane, dynafilm, luparen, escon, ole fane and profax (Syarief et al, 1989). The main properties of propylene are:

  1. Light weight (density 0.9 g/cm^3), malleable, translucent and clear on film. Not transparent in the form of frozen packaging
  2. Has greater tensile strength than polyethylene. At low temperatures it will be brittle, in pure form at -30^oC it is easy to break, so it is necessary to add polyethylene or other materials to improve impact resistance. Cannot be used for frozen packaging.
  3. It is stiffer than polyethylene and does not tear easily so it is easy to handle and distribute
  4. Low water vapor permeability, medium gas permeability and not good for food that must be sterilized
  5. Resistant to high temperatures up to 150$^{0\ C}$, so it can be used for food that must be sterilized

6. The melting point is high, making it difficult to make bags with good hot seams
7. Resistant to strong acids, bases and oils. Good for fruit juice and oil packaging.
8. At high temperatures polypropylene will react with benzene, silken, toluene, turpentine and strong nitrates.

Based on Wijayanti's research (1995), vacuum and vacuumless polypropylene plastic packaging materials for salted mackerel (Rastrelliger neglectus) do not have a significant effect on water and ash content during storage 3 weeks. While the fat content has a significant influence.

- Plastic Film (cling wrap)

  The use of plastic film as a packaging material can protect and preserve stored fruits and vegetables. Plastic film can make packaged products more attractive (Pantastico, 1986). The concentration of gases associated with respiration activities in packaging depends on the permeability of the plastic, the respiration rate of the packaged material and the storage temperature (Deily and Rizvi, 1981)

  Today there are various types of plastic films that can be used for packaging purposes, but only certain plastic films can be used for packaging fresh fruits and vegetables. This is because the concentration of O2 in packaging will usually decrease from the normal concentration of 21% to 2-5% and the concentration of CO2 will increase from a concentration of 0.03% to 16-19% so that it will The consequences are not good for the packaged product. The ideal plastic film is one that has a CO2 permeability three to five times greater than the O2 permeability and depends on the optimum composition for each fresh product packaged (Zagory and Kader, 1988), thus the rate of accumulation of CO2 from the process of respiration is less than the rate of shrinkage $_{O2}$ (Peleg, 1985).

The main plastic films used for packaging fresh products are LDPE (Low Density Polyethylen), PVC (Polyvinyl Chloride) and PP (Polypropylene). In addition, PS (Polystyrene) can also be used, but saran and polyester types have very low gas permeability so they are only suitable for fresh produce with a respiration rate very low (Zagory and Kader, 1988).

Packaging procedures greatly affect the quality of frozen fish. Vacuum packaging and cooling, according to Watts et al. (1966), can reduce the brightness of meat color. This is due to the ability of meat cytochromes to convert metmyoglobin back into myoglobin. When meat is exposed to air, myoglobin undergoes an oxygenation reaction that results in the formation of oxymyoglobin, which is brilliant red in color.

Consumption Fish Packaging

There are two packaging methods commonly done for the transportation of fish fry so that they can live to their destination, namely closed and open methods.

1. Closed Method

Closed system packaging , namely the packaging of live fish using a closed place or container, air from outside cannot enter the media. Packaging by this method can be carried out on transport over long distances for a relatively long time. Transportation equipment can use plastic bags that are given water and oxygen media. The technique of packaging closed systems is carried out by:

a. preparing polyethylene plastic bags,
b. filling plastic bags with clean water and fish fry,
c. Then remove from the plastic bag with the aim of removing carbon dioxide, and continue to put oxygen from the tube into the plastic until the volume of air is 1/3–1/4 part.

d. After oxygen filling, the packaging mouth is tightly fastened with a rubber band.
e. Plastic contains fish fry that are ready, then put in sterofoam so that it is not easily broken and easy to transport

There are advantages and disadvantages of the closed packaging method.

The advantages include :

a) the water medium is resistant to shock during transportation,

b) can be carried out for transportation over long distances (by aircraft),

c) facilitate arrangement in space utilization during transportation.

The disadvantages include :

a) the water medium cannot come into direct contact with air (there is no diffusion of oxygen from the air) so there is no additional oxygen supply,
b) no water change can be made, and
c) requires accuracy in calculating oxygen demand with the length of transportation time.

2. Open Method

Packaging with an open method, namely the packaging of live fish transported by containers or places that use water media that can still be in contact with free air. Open method packaging is carried out in order to transport seeds over short distances that do not take long. Transportation equipment in the form of drums, plastic, insulated crates, and others. Each container can be filled with clean water ± 15 liters to transport about 5,000 3-5 cm seeds (customized and depending on the means of transport). Open method packaging is done by satisfying fish fry first so that the metabolic rate and excretion can be reduced at the time of transportation so that the water is not cloudy by fish excrement (for transportation >5 hours). Stages of packaging fish during transportation, namely:

1. prepare the container,
2. put water and seeds in a container,

3. Apply shade over the container so that the fish fry do not experience stress at high temperatures.

There are advantages and disadvantages of the open packaging method.

The advantages include :

a. diffusion of oxygen through the air into the water medium can still take place,
b. can be added oxygen through an aerator, and
c. Partial water changes can be made during eachroad.

The disadvantages include :

a. can cause stress in fish,
b. cannot be done for shipments by aircraft.
c. This method is very suitable for shipping consumption-size fish by land/sea.

4. Comparison of Open Method and Closed Method

a. Excess

- Water media is resistant to shocks during the transportation process,
- Can be done for long-distance transportation (using fast),
- Facilitate arrangement in space utilization during transportation.
- Diffusion of oxygen through the air into the water medium can still take place,
- Can be added oxygen through an aerator, and
- Partial water changes can be made during the trip.

b. Debilitation

- The water medium cannot come into contact with direct air so there is no additional oxygen supply,
- No water change is possible, and
- Requires accuracy in calculating oxygen demand with the length of transportation time.
- May cause stress in fish,
- Cannot be made for aircraft delivery, and

- This method is very suitable for shipping consumption-size fish by land/sea.

C. Conclusion

Product protection, convenience of storage, informational purposes, and consumer marketing are the goals of packaging. The packaging of fishery products is in line with the core principles of the concept of fisheries industrialization, namely increasing added value, efficiency, and competitiveness (bargaining position), where these three principles will be able to encourage the development of a conducive business climate in a country, including efforts to increase people's income and welfare.

A coordinated method of preparing commodities for transit, distribution, storage, sale, and use is known as packing, containerizing, or packaging. The presence of containers or wrappers can help prevent or reduce damage, protect the product inside from the risk of pollution and physical interference, and protect it from the environment (friction, impact, vibration)

Reference

1. Ahmad, A.F., Maflahah I, &; Rahman A. 2016. The Effect of Packer Type and Storage Duration on Product Quality of Gambus Nuggets. AGROINTEK, 10(2), 70–75. https://journal.trunojoyo.ac.id/agrointek/article/view/2468.
2. Akhmadi, M.F., Imra, I, &; Diana, M. 2019. Fortification of Calcium and Phosphorus in Crackers with the Addition of Milkfish Bone Meal (Chanos chanos). Scientific Journal of Fisheries and Marine, 11(1), 49 –54. https://e-journal.unair.ac.id/JIPK/article/view/11911.
3. Arizona, R., Edi, S, &; Yuny, E. 2011. The Effect of Walnut Shell Liquid Smoke Concentration and Storage Duration on the Chemical and Physical

Quality of Meat. Livestock Bulletin, 35(1), 50–56. https://jurnal.ugm.ac.id/ newsletter/article/view/590.

4. Buchari D and Karnila R. 2006. Fisheries Raw Materials Book. [Pekanbaru marine]. Fisheries and Science, University of Riau.
5. Basu Swastha, 1999 Modern Marketing Management, Third Edition Yogyakarta, Liberty.
6. Czerniewicz, M., Antoni, K., & Katarzyna, K. 2006. Storage Stability of Raw Milk Subjected to Vibration. Polish Journal of National Science, 15, 65–70. http://journal.pan.olsztyn.pl/STORAGE-STABILITY-OF-RAW-MILKSUBJECTED-TO-VIBRATION,98675,0,2.html.
7. Harris, H., & Riya, L. 2011. Packaging Design to Improve the Function and Display of Dry Currency Packaging (Pundang). Journal of Fisheries and Aquaculture Sciences, 6(1), 27–40. https://www.neliti.com/id/publications/ 245784/design-packaging-to-enhance-function-and-look-dry-money packaging.
8. Irawati, A.A., Widado, M.F, &; Apri, D.A. 2016. The Effect of Long Cooking of Fried Soft Thorn Milkfish on the Content of Lysine and Dissolved Protein. Journal of Fisheries Product Processing and Biotechnology, 5(1), 106 – 111. https://ejournal3.undip.ac.id/index.php/jpbhp/article/view/10832.
9. Mulyawan, I.B., Baiq, R.H., Bambang, D., Wiharyani, W., &; Astri, I.S. 2019. The Effect of Packaging Techniques and Types of Packaging on the Quality and Shelf Life of Pindang Bumbu Kuning Fish. Indonesian Journal of Fisheries Product Processing, 22(3), 464–475. https://journal.ipb.ac.id/index.php/jphpi/article/view/28926.
10. Nur, M. 2009. The Effect of Packaging Methods, Types of Packaging Materials and Storage Duration on the Chemical, Microbiological and Organoleptic Properties of Milkfish Satay (Chanos chanos). Journal of

Agricultural Product Technology and Industry, 14 (1), 1–11. https://jurnal.fp.unila.ac.id/index.php/JTHP/article/view/49.

11. Purnamayati, L, Ima, W., Apri, D.A., Ulfah, A., &; Sumardianto, S. 2018. The Effect of Vacuum Packaging on the Quality of Presto Milkfish during Storage. Journal of Aquatic Product Technology, 11(2), 63 –68. https://jurnal.uns.ac.id/ilmupangan/article/view/29052.
12. Puspitasari I, Nuhriawangsa AMP, Swastike W. 2013. The Effect of Turmeric (Curcuma domestica Val.) on Microbial and Physico-chemical Quality of Beef. Tropical Animal Husbandry J. 2(1): 58–64. https://docplayer.info/45089574-Pengaruh-pemanfaatan-kunyit-curcuma-domestica-val-terhadap-kualitas-mikrobiadan-fisiko-kimia-daging-sapi.html. Susanto, E. 2010. Milkfish Processing (Chanos chanos Forsk) Soft Thorns. Delivered at the Counseling Program for Coastal Communities on 27–28 July 2010. Batang County. 1–19. https://www.researchgate.net/publication/278000982_PENGOLAHAN_BANDENG_Channos_channos_Forsk_DUR I_LUNAK.
13. Syarief, R., Sassya, S., &; Isyana, S. 1989. Food Packaging Technology. Food Process Engineering Laboratory. Bogor: Inter-University Center for Food and Nutrition, Bogor Agricultural University. 604 p.
14. Winarno, F.G. 1992. Food Chemistry and Nutrition. Jakarta: Gramedia Main Library. 92 p.