



ARTICLE REVIEW: LEVEL OF EFFECTIVENESS OF PLASTIC MATERIAL TYPES IN PACKAGING OF FISHERY PRODUCTS

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ABSTRACT

The purpose of this article is to review the best use of the type of packaging materials for presto bandeng. Based on literature studies obtained information that the use of pp plastic material type is better than with the type of PE plastic material for packaging bandeng presto and other fishery processed products.

KeyWords: shelf life,vacuum,non vacuum,processed products.

Introduction

Packaging is the activity of designing and making containers orwraps as a product (Kotler 2003). Menurut (Basu 1999), packaging (packaging) is activities that are general and planning of goods that involve determining the betuk or design of making the packaging or packaging of an item. Packaging can maintain and prevent food spoilage by blocking the entry of air that contains many contaminants.

Vacuum packaging is packaging with the expenditure of gas and moisture from packaged products. Vacuum packaging usually uses this type of plastic packaging because it is strong, flexible, malleable, and difficult to penetrate water and air. Types of packaging that have a high density with low water vapor and gas permeability are polypropylene plastic (PP), polyethylene (PE) and aluminum combination packaging with Polypropylene (Al-PP).

Types of materials used for packaging purposes, including materials from metal, wood, glass, paper. Plastics have occupied a very important part of the packaging industry. The advantages of plastic from other packaging materials include relatively cheap, can be formed various forms, colors preferred by consumers. Polyethylene is the most important plastic of all plastics used in general. Polyetylen is divided into two groups: HDPE (High density Polyethylene) and LDPE (Low-density Polyethylene) (Buchari and Karnila 2006).

According to (Susanto 2010) the use of polyethylene plastic with vacuum packaging on soft spine bands can last up to 1 month. This is because the characteristics of the packaging have a high density, resistant to high temperatures, and have low water permeability so as to protect the product (Ahmad et al., 2016). Fishery processed products that usually use the type of plastik for packaging are processed bandeng fish and processed goldfish because both are processed that are very popular by the people of Indonesia. Therefore the purpose of this article is to review the use of the best types of packaging materials for presto bandeng.

Bandeng Fish

Bandeng (*Chanos chanos*) is an important economically valuable fish that is widely maintained in brackish water ponds in Indonesia. This fish is a consumption that plays an important role in meeting people's protein needs because the price is relatively cheap. To meet the protein needs of the bandeng cultivation community has grown rapidly. Bandeng fish has a high nutritional content, especially protein content of 24% and fat 10.58%. The amino acid content of bandeng fish consists of the amino acids glutamate and lysine. In addition, it also contains unsaturated fatty acids, especially oleic acid (Hafiludin, 2015; Prasetyo et al., 2015).

One of the processed bandeng fish is bandeng presto. Bandeng presto or so-called soft thorn bandeng is a bandeng fish that is processed by applying high pressure and temperature. The purpose of processing bandeng fish by dipresto is to facilitate the community in consuming bandeng fish. Bandeng presto usually uses a way of packaging that is vacuum. Shelf live bandeng presto one of them by using vacuum packaging techniques. Vacuum packaging is packaging with the expenditure of gas and moisture from packaged products. In addition, cold storage will inhibit the growth of decaying microorganisms. Vacuum packaging is usually combined with a type of plastic packaging that has strong properties and difficult to penetrate water and air (Mulyawan et al., 2019).

Water Content

Duncan's further test results showed that the type of packaging with long storage had a noticeable different effect. During the 21-day storage of presto bandeng packed PP and vacuum PE experienced an increase in the value of water content by 62-65%, while presto bandeng that was not packaged or packaged PP and non vacuum

PE experienced a decrease in the value of water content by 60-62%. According to research (Kasmadiharja 2008) that the increase in water content is influenced by the amount of free water formed from the side results of microorganism activity. The longer the meat is stored, the food substances contained in the meat will decompose, especially the bound water that comes out, causing the increase in free water. Another factor that affects the decrease in the value of presto water content packed PP and vacuum PE on the 21st day is the use of water for microbial growth. According to (Puspitasari et al. 2013) that the decrease in the value of water content is due to microbes using water for their growth. According to research (Harrisand and Riya 2011) vacuum packaging is more effective in reducing increased moisture content during storage, because in vacuum packaging all water vapor and air has been removed from the packaged product. In addition, PP and PE packaging materials have low water vapor permeability properties so that the occurrence of water vapor transfer can be inhibited.

Ash Rate

During the 21-day storage of presto bandeng packed PP and vacuum PE decreased in value, while presto bands that were not packaged or packaged PP and non vacuum PE experienced an increase in the value of ash levels by 12%-14.02%. According to (Winarno 1992) ash levels are related to the mineral content of a foodstuff. The higher the ash content, the higher the mineral content in the food. The ash content of this study is still quite high, this is because in the presto bandeng there are fish bones that contain minerals that are quite high, including calcium and phosphorus. According to (Akhmadi et al. 2019) the main elements of fish bones consist of calcium, sodium, strontium, phytate, chloride and sulfate.

Fat Content

During the 21-day storage, the presto bandeng experienced an increase in the value of fat levels in each treatment. The increase is thought to be the process of autolysis caused by the decomposition of fat into simpler compounds such as fatty acids. Presto bands that are not packaged or packaged PP and non vacuum PE experienced an increase in the value of fat content by 8-12%, while packaged PP and vacuum PE increased by 16-19% due to the availability of oxygen in the packaging which caused the oxidation process and autolysis process to take place quickly. In addition, if the excess fat content will cause fat oxidation and can produce a rancid odor in the presto bandeng. According to (Purnamayati et al. 2018) the high in fatty acids is related to the availability of oxygen in the packaging. Oxygen will trigger the hydrolysis of fat.

Protein Levels

Duncan's further test results showed that the type of packaging with long storage had a noticeable different effect on the levels of the presto bandeng protein. Decreased levels of presto bandeng protein is suspected of the

influence of microorganisms present in the product. The cause of the decrease in protein levels is the activity of proteolytic bacteria that can digest proteins. This is supported by research (Czerniewicz et al. 2006) proteolytic bacteria can grow and develop over a long period of storage at refrigerator temperature, thus causing the process of protein degradation. According to research (Ahmad et al. 2016) pp packaging types are better at maintaining protein content because pp packaging types have lower gas permeability properties, causing nugget protein to be reduced slightly than PE packaging.

Microbiological Analysis

Total Plate Count (TPC)

Based on the results of the study it can be seen that during cold storage, the presto bandeng experienced an increase in the total number of microbes. The high total number of microbes is likely due to the presence of oxygen and water activity to support microbial growth. Vacuum-packed presto bandeng has a lower total microbes of 0.014-0.85 colonies / g compared to nonvakum which is 0.028-0.151 colonies / g. According to Mulyawan et al. (2019) when airtight conditions microbial growth can be suppressed because the availability of oxygen in the packaging is very minimal. In PP packaging the microbial value is lower, which is 0.014 colonies / g and on PE packaging the microbial value of 0.042 colonies / g. According to Nur (2009) PP packaging has lower permeability properties to water vapor, in addition PP packaging has better watertight and water vapor properties compared to PE packaging.

Organoleptic Test

Appearance

During 21 days storage the presto bandeng packed PP vacuum is better at withstanding the change in color appearance because it has a golden yellow color while the packed PE vacuum and others have a rather dull golden yellow color. PP packaging has permeability properties to water vapor and gases that are lower so that it can inhibit the growth of crushing microbes and prevent fat oxidation, while PE packaging has high enough gas permeability properties that easily absorb oxygen from the outside and cause the availability of oxygen in the packaging to spur microbial growth.

Smell

During storage 21 days presto bandeng packed PP vacuum is better in withstanding odor changes because there has not been an acid odor while the packaged PE vacuum and others have begun to arise sour odor. This type of PP packaging has permeability properties to medium gases, while PE packaging has gas permeability

properties that are high enough to easily absorb oxygen from outside the packaging and cause the availability of oxygen in the packaging to trigger the oxidation reaction process. The process of quality deterioration by microorganisms produces a number of volatile bases such as ammonia, histamine, indol, H₂S and skatol which cause oxidation reactions and cause foul odors (Nur 2009).

Taste

During the 21-day storage the presto packed PP vacuum has a bland taste while the packaged vacuum PE and others have a sour taste. According to Arizona et al. (2011) foodstuffs that contain a lot of protein if damaged by microbes will produce an increasingly acidic and less preferred taste. In addition, this type of PP packaging has permeability properties to medium gases so that it can inhibit the process of decomposing proteins in the presto bandeng.

Texture

During 21 days storage the vacuum PP-packed presto bandeng is better at withstanding changes in texture because it has a dense texture and is slightly mushy whereas the packed vacuum PE and others have a flabby texture. According to (Nur 2009) a decrease in the connective power of water from proteins causes the texture to become mushy. According to (Syarief et al. 1989) the type of PP packaging has watertight properties and water vapor, while in vacuum conditions will inhibit air circulation and water vapor so that it can inhibit the growth of microorganisms that cause the texture of the presto bandeng to become mushy and soft.

Mucus

Bandeng presto packed with vacuum and non vacuum and unpackaged can withstand changes in mucus and have mucus that has dried up According to research (Arizona et al. 2011) the decrease in the score on the slime parameters is characterized by the formation of mucus caused because proteins in the form of amino acids have undergone metabolic processes by microbes so that meat becomes wet and mushy.

Conclusion

Based on literature studies obtained information that the use of pp plastic material type is better than that of a PE plastic material for packaging bandeng presto and other fishery processed products.

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