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REVIEW ARTICLE : USE OF POLYETHYLENE PLASTICS AS PACKAGING MATERIALS FOR FISHERY PRODUCTS

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KeyWords
Water content, protein, microbes, contamination.

ABSTRACT

This article aims to examine the use of plastic made from polyethylene as fishery product packaging on its quality. Based on the literature study, information was obtained that polyethylene plastic packaging is very good in maintaining the water content of a product, especially in fish-based food products. Polyethylene has the effect of increasing the amount of protein in a product and reducing the number of microbes associated with changes in aroma and texture. But polyethylene does not work well in products containing oil.

INTRODUCTION

There are two things that cause food spoilage, namely the damage caused by the nature of the product which takes place spontaneously and the second is caused by environmental influences. According to Nur (2009), to prevent or delay the process of food spoilage, packaging needs to be done. Buckle et al (1987) also informed that packaging is used to confine foodstuffs in their normal environment to delay the spoilage process for a certain period of time.

In maintaining the shape and quality of a product, packaging techniques are also needed so that the product is protected from contamination and damage from the external environment. There are many types of packaging materials, one of which is plastic. Winarno (1993) stated that plastic is a packaging that is still widely used because it is a very important part of the packaging industry.

The most common plastic found in packaging products is polyethylene. According to Achmad et al (2016), polyethylene packaging has a high density, is resistant to temperature and humidity, and has low water absorption so that it can protect the product. In addition, plastic is unique in its physical appearance, namely, it is very elastic, has a transparent color so that the product will be visible from the outside of the packaging.

Polyethylene is the result of the polymerization reaction of ethylene monomer. If ethylene polymerization is carried out at high pressure it produces Low-Density Polyethylene (LDPE), whereas if carried out at relatively low pressure it will produce High Density Polyethylene (HDPE). Polyethylene ranks first in plastic consumption in Indonesia, it makes a lot of factories produce packaging materials with polyethylene materials. Polyethylene is usually produced in 3 types, namely low density, medium density, and high density (Karyadi, 1997). Judging from its advantages, polyethylene plastic is very well used in packaging fishery products, as we know that the product is most quickly damaged if exposed to contamination from the environment. In this review, the following article aims to examine the use of polyethylene plastic as packaging for fishery products on the quality.

METHOD

In this review article, the literature review method is used, by collecting several journals to be compared and then drawing conclusions. Literature review was conducted through electronic-based journals.

RESULTS AND DISCUSSION

Water content

Water content in food product resilience is very important, water content affects the determination of the quality and resistance of food products against possible damage. Polyethylene material has an effect on determining the water content, as mentioned by Achad et al (2016), in their research there is a significant effect of water content on the water content of nuggets, but the water content of the type of polyethylene has not affected the SNI standard by 60%, when compared to PP plastic, PE plastic has a lower moisture content.

Table 1. Average type of packaging on water content of gembus nugget (Achmad et al, 2016)

Packing Type	Average(%)
No Packer	34,957a
PE	67,972b
PP	69,697b

Meanwhile, according to Mamerta and Sofia (2011), that the permeability of polypropylene plastic is smaller than that of polyethylene plastic so that water vapor will be more difficult to penetrate polypropylene plastic than polyethylene. However, according to a study conducted by Fajrin (200), although the permeability of water vapor and gas to PP plastic is smaller than that of PE plastic, if measured on a scale of 1-10, the permeability of PP and PE plastic to water vapor, gas, and odor is the same. When viewed from the research conducted by Achmad et al (2016), the water content of PE is lower than PP, but the difference is not significantly different. In determining the water content, there are factors that influence it, namely, temperature, humidity, and others. As Latifa (2010) said during storage there should be an increase in water content, but under certain conditions it can decrease. This can occur due to an increase in temperature and a decrease in humidity, thereby causing the transfer of water vapor from the material to the environment, finally the water content in the material decreases. As said by Winarno and Betty (1983) explained that the water content during storage is strongly influenced by the relative humidity of the air around the material.

Protein Level

Packaging materials have a significant effect on protein content of nugget gembus, as research conducted by Achmad et al (2016). And maintain protein levels above the SNI standard of 15%.

Table 2. The Effect of Packaging Type on Average Nugget Gembus Protein Levels (Ahmad, et al)

Packing type	Average(%)
No Packer	23,931a
PE	27,434b

In addition, there is another factor, namely the length of storage time, as mentioned by Agus et. al (2013) there is a tendency to decrease protein levels as a result of the longer storage time. This decrease is thought to be due to the activity of proteolytic bacteria that can digest protein. This statement is supported by research conducted by Creniewicz (2006) proteolytic bacteria can grow optimally at room temperature, but can still grow and develop over time at refrigerator temperature, so that it can cause protein degradation. The number of bacteria present in the packaging is closely related to the permeability of the plastic. Proteolytic bacteria are classified as aerobic bacteria that will grow optimally in the presence of oxygen. The more oxygen in the environment, the more optimal the growth of proteolytic bacteria.

Microbes

Microbes are the most important thing in the deterioration of a product, especially in fishery products which are very susceptible to microbial growth. Polyethylene plays a very important role in preventing microbes from entering the product, such as research conducted by Muhammad nur (2009), in the packaging of milkfish satay there is a reduction in the number of microbes from being wrapped in ordinary plastic and polyethylene, because it has a lower permeability to gas and water vapor. thereby preventing the occurrence of microbial contamination. But PE packaging can only reduce a little because it is not very good for oxygen and carbon dioxide.

According to Rahayu et al., (1992) explained that odor and aroma deviations that occur in fishery products are caused by the presence of enzymes and microorganisms. The stench occurs due to the activity of proteolytic bacteria that break down proteins into simple compounds such as polypeptides, amino acids, H2S, indole, and skatole. While the rancid odor is caused by lipolytic enzymes and oxygen. With this, with packaging, the contact between the packaged product and the surrounding air can be reduced so that it can also reduce aroma-modifying microorganisms.

Polyethylene is not good when used in products that have an oily texture because it is slightly sensitive to oxygen. But polyethy-

lene plays an important role in maintaining the texture of the product because it has good permeability, and polyethylene is quite good in moisture and moisture content.

Conclusion

Based on a literature study, information was obtained that polyethylene plastic packaging is very good at maintaining the water content of a product, especially in fish-based food products. Polyethylene has an effect in increasing the amount of protein in a product, and reducing the number of microbes associated with changes in aroma and texture. But polyethylene is not good at products containing oil

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