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1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 1 Modification Of Gelamai Payakumbuh Through the Addition Of Yellow Pumpkin (Cucurbita Moschata Duch) And Improved Packaging Ermiati Ermiati*, Gusmalini Gusmalini Agriculture Polytechnic State Payakumbuh, Indonesia *munirermiati@gmail.com Abstract. This study entitled "Modification of Gelamai Payakumbuh through the Addition Yellow Pumpkin (Cucurbita moschata) and Improved Packaging" was conducted in order to empower local roots based on the traditional foods of the Payakumbuh area and also incorporating it with proper packaging techniques using various types of packaging materials to extend product shelf life. The research objective is to diversify the product of processed pumpkin gelamai, a specialty food from the city of Payakum buh.

This involves determining the proper formulation in the manufacturing of gelamai with the addition of yellow pumpkin, as well as extending the shelf life of processed gelamai through treatment and packaging modifications. Research was carried out for six months at the Payakumbuh Erina Gelamai Company and the Laboratory of Food Microbiology at the State Food Chemistry and Agriculture Polytechnic of Payakumbuh. The design used in this laboratory study was a Complete Randomized Design (CRD) arranged in a factorial with two factors, where each treatment was repeated three times.

The first factor was modification by the addition of pumpkin waluh at 10%, 20%, 30%, and 40%. While the second factor was the treatment of the packaging type by using polypropylene plastic, aluminum foil, dried banana leaves, dried corn leaves, and glassine paper. The results showed that the diversification of product in the manufacturing of processed pumpkin gelamai can enhance flavor, fat content, and

extend shelf life.

The addition of pumpkin in the production of gelamai can suppress the formation of free fatty acids and the oxidation process during the storage. Th e best treatment was found to be modification by the addition of 30% pumpkin with the use of aluminum foil packaging, which can extend shelf life for 20 days at room temperature. Keywords: yellow pumpkin; shelf life; gelamai; packaging 1. Introduction “Gelamai Payakumbuh” is a traditional food made from gelatinous rice flour, brown sugar, and coconut milk and it is made by traditional coagulation.

The mixture is then refrigerated and cut into pieces according to the desired size, usually of small size, and wrapped in pla stic. Salt, margarine, chocolate [1], and sesame seeds can be added to the mixture, which can improve the quality of gelamai. Gelamai is can make a great gift due to its delicious taste. It is a traditional food usually eaten during traditional celebrations or as a snack. Gelamai is also often offered as a food gift to those who travel to other areas. Yellow pumpkin can also be added to the gelamai mixture to improve its taste and appearance. Yellow pumpkin (Cucurbita moschata Duch) is a nutritious food and serves as a functional food source of antioxidants and dietary fiber.

The total caroten level of yellow pumpkin is 0.0336 mg/gram [2] while also containing flavonoids and terpenoids [3] It is also rich in vitamin C and carbohydrates, so it can be processed into intermediate 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 2 moisture food.

The high antioxidant content in yellow pumpkin is expected to prevent the oxidation process in the storage process of gelamai by extending its product shelf life. Gelamai is categorized as an intermediate moisture food because it is pertained to have limited shelf durability. One of the factors that affect the shelf life of products is the use of proper packaging. Currently gelamai is only sold in conventional and unconventional packaging, so it is yet to have a high sell value as a superior product of West Sumatra [1].

The packaging materials used to wrap gelamai are usually made from plastic and dried banana leaves. Th e selection of appropriate types of packaging as well as the addition of yellow pumpkin as a source of antioxidants is expected to extend the shelf life of gelamai. The purpose of this study was to diversify gelamai into other processed products such as yellow pumpkin gelamai, determine the proper formulation of the addition of yellow pumpkin to gelamai, and to extend the shelf life of processed gelamai

through treatment and packaging modifications. 2. Materials and Methods The materials used in this study were yellow pumpkin, brown sugar, rice flour, and coconut milk.

The design used in this study was the Complete Randomized Design (CRD) which was arranged in a factorial with two factors where each treatment was repeated 3 times. The treatments used were as follows: Factor A: Modification with the addition of yellow pumpkin A0. Gelamai processing without the addition of yellow pumpkin A1. Gelamai processing with the addition of 10% yellow pumpkin A2. Gelamai processing with the addition of 20% yellow pumpkin A3. Gelamai processing with the addition of 30% yellow pumpkin A4. Gelamai processing with the addition of 40% yellow pumpkin Factor B: Treatment through the type of packaging B1.

Polypropylene plastic packaging B2. Aluminum foil packaging B3. Dried banana leaf packaging B4. Dried corn leaf packaging B5. Glassine paper packaging The results were analyzed by ANOVA followed by a DNMRT test (Duncan's New Multiple Range Test) with the real level of 5%. 3. Results and Discussion A. Rendemen Yield The average yield of gelamai with the addition of yellow pumpkin can be seen in Figure 1. Figure 1. Average rendemen of gelamai 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf.

Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 3 Description: A0 = gelamai processing without the addition of yellow pumpkin A1 = gelamai processing with the addition of 10 % yellow pumpkin A2 = gelamai processing with the addition of 20% yellow pumpkin A3 = gelamai processing with the addition of 30% yellow pumpkin A4 = gelamai processing with the addition of 40% yellow pumpkin From Figure 1 it can be seen that the average yield of gelamai decreases with the increasing addition of yellow pumpkin; this is because of the large water evaporation that occurs, where the moisture levels of yellow pumpkin reach up to 90%. The yield of gelamai without the addition of different quantities of pumpkin was not significantly different. This was also the case with the addition of 10%, 20%, and 30% pumpkin.

However, results were significantly different with the addition of 40% yellow pumpkin; this is because the increasing addition of yellow pumpkin will also lead to more water evaporation in the gelamai. The moisture content of yellow pumpkin is 90-93 percent [4]. B. Organoleptic Test The average organoleptic tests including color, flavor, aroma, texture, and appearance of the yellow pumpkin gelamai can be seen in Figure 2. Figure 2. Organoleptic test chart of yellow pumpkin gelamai From Figure 2 shows that the gemalai with the highest average score of color, flavor, aroma, texture, and appearance

was treated with A 3, namely gelamai with the addition of 30% yellow squash, which was significantly different from the other treatmen ts except for the smell that the gelamai generated. This means that the gelamai with the addition of 30% pumpkin was most preferred by the panelists in terms of color, flavor, aroma, texture, and appearance.

Yellow pumpkin contains natural dye pigments of carotenoid that are yellow, red and orange, namely beta carotene at 160 mg/gram. These carotenoids function as vitamin A precursors and antioxidants which are effective at low oxygen concentrations [5]. C. Moisture Content The average moisture content of gelamai with the addition of yellow pumpkin at 0 (zero) days of storage can be seen in Figure 3. 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 4 Figure 3.

Average moisture content in the storage of gelamai at 0 days From the figures contained in Figure 3 it can be concluded that the average water content of gelamai is reduced with the increasing amount of yellow pumpkin added. This is because gelamai is categorized as an intermediate moisture food product, so its water content ranges from 20% to 24%. The water content of intermediate moisture food products is 10-40% with an Aw value of 0.65-0.90 [6]. The low moisture content of gelamai with a high amount of added pumpkin will increase its durability during storage, which will lead to a longer shelf life.

A high moisture content will stimulate the growth of microorganisms that will spoil the pumpkin gelamai and cause rancidity. There can also be an increase in the number of growing microorganisms during the storage period. This is caused by an increase in water content. Water content in foodstuffs affects the occurrence of change and determines microbial growth and also influences product safety for consumption[7]. Gelamai is packaged in various types of pack aging, including both artificial and natural packaging.

Packaging has an artificial low permeability to oxygen and water vapor, but because it is not packaged in a vacuum it allows the occurrence of elevated levels during the storage process. Figure 4. Average moisture content of gelamai during 20 days of storage From Figure 4 it appears that there was an increase of moisture content in the gelamai after 20 days of storage, with the highest increased moisture content seen in gelamai packaged in dried banana leaves, dried corn leaves, and glassine paper. This is because the packaging has high permeability to water vapor and oxygen, so there is a possibility of a substantial increase in water content.

Food product damage can be caused by the absorption of water by the product during storage. Product damage can be observed from the decrease in hardness or crispness, and/or enhanced stickiness or clumping. The water absorption rate of food 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 5 products during storage is affected by the pure water vapor pressure at a certain air temperature, water vapor permeability and packaged area, the initial moisture content of the product, initial dry weight of the product, critical moisture content, and water content equilibrium at RH storage[8]. D. Fat content The average fat content of gelamai with added pumpkin can be seen in Figure 5. Figure 5.

The average fat content of gelamai Figure 5 shows that the treatment of A4 (gelamai processed with the addition of 40% yellow pumpkin) has the highest fat content, which is significantly different from the other treatments. This was because the A4 treatment had the highest amount of added pumpkin at 30%. Pumpkin flesh contains as much as 0.8% fat, so an increasing addition of pumpkin in the gelamai also increases fat levels. E. Levels of Free Fatty Acid (FFA) The average free fatty acid levels of gelamai at 0 (zero) days of storage can be seen in Figure 6. Figure 6.

The average free fatty acid levels of gelamai at 0 days of storage Figure 6 shows that an increase in the water content of gelamai also leads to an increase in free fatty acid levels. This is due to the water content of gelamai that can potentially lead to the hydrolysis of fats that can increase levels of free fatty acids. Figure 7 reveals that there was an increase of free fatty acid levels in gelamai after 20 days of storage. This is in line with the increase of moisture content of gelamai after 20 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 6 days of storage, so rancidity caused by the hydrolysis of fat is also higher. Free fatty acid levels increase with increasing water content and storage duration due to hydrolysis reactions [9].

Hydrolysis is the decomposition of complex compounds into simpler compounds that can cause the moisture content in gelamai to be trapped in a complex bond that will easily evaporate, resulting in the increase of the Aw of the gelamai surface, causing mold to easily grow. In addition to the evaporation of water, there will also be a hydrolysis of fats into fatty acids and glycerol. Figure 7. The mean levels of free fatty acids in gelamai at 0 days and 20 days of storage From Figure 7 it appears that treatment of this type of packaging in storage significantly influenced the free fatty acids in gelamai.

The gelamai with the longest shelf life was found to be the treatment with the addition of 40% pumpkin packaged in aluminum foil. Aluminum foil packaging material is composed of a metal material that is hermetic, flexible and opaque, so it has high protective properties against moisture, light, fat, and gases [10]. F. Microbiology test The average total microbial and total mold yeast in gelamai at 0, 15, 20, and 30 days of storage can be seen in Table 1. Table 1. Average total microbial and total mold yeast in gelamai at 0, 15, 20,and 30 days of storage.

Treatment Total microbial (cfu/g) total mold yeast (cfu/g) 0 day 15 day 20 day 30 day 0 day 15 day 20 day 30 day A0B1 1.8 x 105 Can"t accounted Can"t accounted Can"t accounted 2.5 x 105 Can"t accounted Can"t accounted Can"t accounted A0B2 1.8 x 105 Can"t accounted Can"t accounted Can"t accounted 2.5 x 105 Can"t accounted Can"t accounted Can"t accounted A0B3 1.8 x 105 Can"t accounted Can"t accounted Can"t accounted 2.5 x 105 Can"t accounted Can"t accounted Can"t accounted A0B4 1.8 x 105 Can"t accounted Can"t accounted Can"t accounted 2.5 x 105 Can"t accounted Can"t accounted Can"t accounted A0B5 1.8 x 105 Can"t accounted Can"t accounted Can"t accounted 2.5 x 105 Can"t accounted Can"t accounted Can"t accounted A1B1 1.3 x 105 9.3

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x 104 Can”t accounted Can”t accounted Can”t accounted Table 1 indicates that the highest amount of total microbial yeast and mold was found on day 0 of storage in the gelamai processed without the addition of pumpkin, followed by the treatments with the addition of 10%, 20%, and 40% pumpkin. Meanwhile, gelamai with the addition of 30% pumpkin had lower total microbial and total mold yeast levels compared to gelamai with 20% and 40% pumpkin. All treatments at 0 days of storage were below the threshold standard for the food, ie <106 cfu / g. This is because although aseptic packaging is performed during processing, there is still a possibility of contamination during this process.

After 15 days of storage, it was found that there was an increase in the number of total microbial and total mold yeast; this is because there was contamination in the gelamai product. Contamination can come from tools, packaging materials, workers and the processing room [5]. Gelamai treatment without the addition of pumpkin cannot be accounted in all the 15 days of storage. Whereas gelamai with the treatment of 10%, 20%, 30%, and 40% added pumpkin with polypropylene plastic and aluminum foil packaging did not account for an increasing number of microbia, and was still within the threshold of being safe for consumption.

The use of corn leaves, glassine paper, and dried banana leaves was also not accounted for at 15 days of storage. On 20 days of storage, gelamai with the addition of 20%, 30%, and 40% pumpkin and packaged using polypropylene plastic containers and aluminum foil were safe to eat because they were still below the safe threshold required. However, on 30 days of storage all the gelamai could not be accounted and were also unfit for consumption. 4. Conclusion Based on the above results some of the conclusions that can be drawn are as follows: 1.

The diversification of product in the manufacturing of processed yellow pumpkin gelamai can enhance flavor, fat content, as well as extend shelf life. 2. The addition of yellow pumpkin suppressed the formation of free fatty acids and the oxidation process during the gelamai storage process. 1st Lekantara Annual Conference on Natural Science and Environment (LeNS 2021) IOP Conf. Series: Earth and Environmental Science 1097 (2022) 012003 IOP Publishing doi:10.1088/1755-1315/1097/1/012003 8 3. The best treatment was the treatment with the addition of 30% yellow pumpkin to the gelamai.

Aluminum foil packaging can extend the shelf life of gelamai to 20 days at room temperature with a total of 5.4 x 106 mold and yeast . References [1] W. Kasmita, R. Gusnita, D. Holinesti, L. Fai sal, Asnur, Pasaribu. "Development regional leading product, diversification of gelamai in Harau sub dsitrict,fifty of city, West Sumatra". Logista Journal scientific of community service, vol. 2, no.2, ISSN: 2579-628, 2018. [2] N. P. Sari, and D. R. P. Widya, "Effect of storage time and cooking method on the physico-chemical characteristics of yellow pumpkin (Cucurbita moschata)". Journal Food and Agroindustry. vol. 6, no.1, pp. 17-27, 2018. [3] I. Sunnah, K. Erna and O.

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