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International Conference on Sustainable Agriculture IOP Conf. Series: Earth and Environmental Science 327 (2019) 012018 IOP Publishing
doi:10.1088/1755-1315/327/1/012018 1 Optimisation on Frequency of Addition to the Volume of Water by Mechanical Milling Coconut Milk in Traditional Food oce Galamai ' Evawati¹, I Roza², R A Fadri² 1 Program Studies Food Technology, Departement of Agricultural Technology, Agricultural Polytechnic State of Payakumbuh, Regency of West Sumatra, Indonesia 2 Program Studies Food Technology, Departement of Agricultural Technology, Agricultural Polytechnic State of Payakumbuh, Regency of West Sumatra, Indonesia Corresponding autho -mail address: evawati72@yahoo.com Abstract. Coconut milk is the main raw material needed for processing galamai.

Galamai quality is strongly influenced by the quality of the milk used. In the mechanical processing of coconut milk, coconut milk produced is influenced by the amount of additional water and frequency milling. The process of adding the coconut milk in the manufacture of galamai there are two phases to dissolve " saka " and thick coconut milk to dissolve rice flour and Glutinous rice flour.

Not yet known how much additional water volume and frequency of the mechanical squeezer milling machine to produce coconut milk coconut meat that is suitable for the manufacture of galamai. The research method is design completely randomized design (CRD) with two factors based on the results of the study treatment Gives the best results of treatment A2B3 (weight ratio and weight addition of grated coconut water is 1: 1 and frequency milling 3 times).

Keywords: Coconut Milk; Galamai; Frequency Mechanical Milling; Glutinous Rice Flour 1. Introduction Coconut milk, white-colored liquid, is an emulsion of oil in water extracted

from fresh coconut meat. Maturity coconuts is a critical factor in the extraction of coconut milk.

Coconuts which are not old, when extracted will produce milk in small amounts and low quality [8]. Added [1] Coconut milk is obtained by extortion coconut meat that has been shredded by the addition of water in a certain amount. According to [13] ratio of water to the grated coconut 1: 1 and 1: 2.

While [6] Addition of water in the extraction of coconut done gradually (with a frequency of 2-3 times) until the milk obtained clearly no longer contain oil. The total addition of water 2 times the weight of grated coconut. According [12] Scar and extortion coconut using this machine **will be able to** produce milk with the quality and quantity is better than scar and extortion with traditional tools. Added by [11] average capacity squeezer machine 29.532 Kg milk / hour.

Coconut **milk is the main raw material needed** to manufacture galamai, **galamai quality is strongly influenced by the quality of the milk used.** At extortion mechanical **coconut milk, coconut milk produced** in addition affected by palm varieties are also determined **by the amount of additional water and frequency milling.** Coconut milk is used for the processing of galamai consists of two kinds of **International Conference on Sustainable Agriculture** IOP Conf.

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doi:10.1088/1755-1315/327/1/012018 2 thick coconut milk and thin coconut milk. Thick **coconut milk contains a** lot of fat so that the resulting galamai which has a delicious taste and form a smooth texture. Thin coconut milk is used to dilute the flour, so the dough and to dissolve the sugar.

Galamai is a typical food of the Payakumbuh city which has been widely known to the public as souvenirs and culinary tours, pertained to food semi-wet (Intermediate Moisture Food-IMF), galamai for Java known as porridge or dodol , According [1], porridge is a kind of food that have the nature of a rather wet so it can be eaten without moistened beforehand (rehydration). Coconut milk in dodol serves to obtain a certain firmness, flavor and aroma.

Coconut milk used **in the manufacture of** porridge is taken from an old coconut, fresh, and clean. Aging will affect the level of coconut oil produced. The use of oil is enough to produce a porridge with good quality and ease in packing. Oil shortage to the frame will cause sticky when packed, while the excess oil will also accelerate the process of rancidity [16] According [18, 13] foodstuffs that are high in fat susceptible to rancidity,

especially because hydrolyzed and oxidated.

Based on the above, we need a study that aims to assess the optimization of additional water volume and frequency of coconut milk by mechanically grinding extortion especially traditional food processing such as galamai. 2. Research Method The experimental design used in this research is to use the design of completely randomized design (CRD) with three times repetition.

Two factors in this study, namely A (Comparison of grated coconut to the volume of water addition), A1 (1 ½), A2 (1: 1), A3 (1: 1½), A4 (1: 2) and B (Frequency addition of water) B1 (one time), B2 (twice), B3 (three times) with repeat three times. Combination treatment is A1B1, A1B2, A1B3, A2B1, A2B2, A2B3, A3B1, A3B2, A3B3, A4B1, A4B2, and A4B3.

Results were analyzed by ANOVA and continued with DNMRT test (Duncan's New Multiple Range Test) with a significance level of 5% by the method of SPSS System). The analysis performed in this study is the analysis of fat content, water content, protein content, ash content, and carbohydrate content using AOAC method [2], as well as yield and long ripening process galamai. The processing is done mechanically ranging from extortion coconut milk and kneading galamai.

According [6] Dimensions of machine specifications extortion made coconut milk has a specification as follows: Materials made of angle iron frame 40 mm ST 37 material with dimensions of length 100 cm and width 60 cm. a. The electric motor is used 1.5 HP / 1450 RPM. b. Sieve mesh size of 20 mesh. c. 25 cm diameter screw press. d. Worm Gear with reduction ratio 60 WPX lap of 1: 30 ROHA. e. Inlet and exit is made with stainless steel plate 10 mm thick. f.

Material wall plate press machine using 2 mm thick stainless steel. g. Pulley used with size 3 in diameter and 7 in. h. Engine capacity 20 Kg / h. While the workings of milk squeezer machine is as follows; Enter the shredded coconut into the mouthpiece of the machine (according to treatment), then grated coconut will be rotated and inserted into the screw / screw in a tube press, then threaded / screw running with the principle of the force of pressure, then the milk will separate exit through the filter, and the pulp will come out through the sewer coconut pulp.

Specifications galamai kneading machine which is the length x width x height 160x 20 x 130 cm, motorcycle engine: a 1.5 HP - 4 P - 1 PAS with a working capacity of 20 kg for a stirring (2.5 h) Further galamai making process, namely: Mixing (thick coconut milk, sugar saka, and palm sugar), heating (until sugar is dissolved), the inclusion of glutinous

rice flour and rice flour (previously dissolved with thick coconut milk), cooking I (cooked until thick and glossy), cooking II (insert syrup glucose and margarine, printing and packaging). This study was conducted in Small and Medium **International Conference on Sustainable Agriculture** IOP Conf.

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doi:10.1088/1755-1315/327/1/012018 3 Enterprises (SMEs) 'Nita' located in Sicincin Payakumbuh, and in the laboratory Polytechnic State Agriculture Payakumbuh. 3. Result and Discussion 3.1 Fat Content From Figure 1 it can be seen that the addition of **water volume and frequency of** milk mechanically grinding extortion especially traditional food processing such as galamai affect the fat content.

The lowest fat content on A4B1 treatment which grated coconut comparison: the volume of additional water = 1: 2, with the frequency of grinding one time. Levels of fat in the treatment of A4B1 was 7.81%. While treatment has the highest fat content is in treatment A2 B3 is grated coconut comparison: the volume of additional water = 1: 1, with three times the frequency milling.

According [15] The more water that is used in making coconut milk, the milk is more dilute so the water level is higher and the lower the dissolved solids such as fat content. Besides, the lower the viscosity of the viscosity also in comparison with grated coconut milk: the volume of additional water = 1: 1 was 0.055 kg / ms Added by [6] To obtain optimum extraction results in extortion milk needs to be done gradually.

Besides, in the processing of galamai of 12 treatments over turns to the treatment comparison grated coconut and additional volume of water = 1: 1/2 shortage of oil so that the processing time is rather sticky. Added by [16] on the oil shortage will cause a sticky porridge packed time, while the excess oil will also accelerate the process of rancidity.

The destruction of fat mainly caused by the rancidity due to the autoxidation of unsaturated radical fat acid in fats. Free radical of oxygen forms active peroxide that able to form hydroperoxide that is unstable, easy to break into substance with shorter carbon chain by high radiation, high heat level, metal catalyst or enzymes. Substances with shorter carbon chain are fat acids, aldehydes, volatile ketones and produces rancidity in fats [16].

The process of fat breakdown in a material can be hydrolytic and oxidative. Hydrolytic damage that is fat can increase the amount of free fatty acids. Rancidity that occurs as a result of damage to fat, caused by release of fatty acids that have evaporated, especially

of fatty acids short ber C atoms, such as fatty C4, C6, C8 and C10 [5] Unsaturated fat acid can chain the oxygen in its complete chain thus produce peroxide.

The existence of peroxide in long term can cause vitamin destruction content in the oil [14]. Added by [12]; the rancidity level increase as the peroxide level, peroxide can cause the destruction of vitamin such as vitamin A, C, D, E, K and few of Vitamin B. Overall levels of fat from galamai still meet the Indonesian National Standard, with a range of fat content was 7.81% - 10.6%.

Fat content galamai / porridge according to SNI 01-2986-1991 is at least 7%. For more details can be seen in Figure 1. 3.2 Protein Content From Figure 1 it can be seen that the addition of **water volume and frequency of** milk mechanically grinding squeeze on traditional food processing galamai no effect on protein content galamai. Range protein content of 12 treatments is 3.147% - 3.707%.

The addition of coconut water volume in extortion and blackmail frequency milk provide protein levels decrease tendency galamai. Based on the National Standard SNI 01-2986-1992 protein content of porridge / galamai / dodol min 3%. **International Conference on Sustainable Agriculture** IOP Conf. **Series: Earth and Environmental Science** 327 (2019) 012018 IOP Publishing doi:10.1088/1755-1315/327/1/012018 4 Figure 1.

Levels of Fat, Protein Content, Moisture Content and Ash Content Galamai 3.3 Water Content Of the various levels of volume addition of water and frequency of grinding extortion coconut mechanically on traditional food processing galamai affect the water content galamai, range water content of 12 treatments over is 15.220% - 23.733% According to [3].

The range of moisture content expressed galamai belong to the semi-wet foods (intermediate moisture food-IMF). Porridge is one type of wet semi food which **has a water activity** (A_w) ranged from 0.70 to 0.90. This is because **the presence of water activity in the** porridge contained moisture content of approximately 15-50%.

Based on the National Standard SNI 01-2986-1992 water content of porridge / galamai / dodol max 20%. Various levels of **additional water volume and frequency of** milk mechanically grinding squeeze on traditional food processing treatment galamai adding water volume to double the grated coconut with the addition of water to produce a wide range of frequencies galamai with water content passes ISO standard.

Water can hydrolyze the oil into glycerol and free fatty acids. This hydrolysis process is

aided by the presence of acid, alkaline, moisture, heat and enzymes such as lipase lipolitic [12, 13]. Hydrolysis of oil caused a rancid taste in the oil. Triglycerides decomposition would be perfect if the available water is quite a lot.

The effect of this hydrolysis process is a fatty acid that is shaped autocatalysis accelerate the reaction and the action of the enzyme on oil. For palm oil hydrolysis process have significance, because almost 90% of triglycerides having short hydrocarbon chain fatty acids are C6 to C14. The short-chain fatty acids when removed from the ester bond would cause unpleasant odors, especially the smell of caproic acid, capric acid and caprylic acid [4].

3.4 Ash Levels Various levels of additional water volume and frequency of milk mechanically grinding squeeze on traditional food processing galamai effect on ash content, ash content ranges from 12 treatment above is 1.110% - 1.473% Based on the National Standard SNI 01-2986-1992 ash content of porridge / galamai is max 1.5%, this means galamai has a number of macro and micro mineral elements that the body needs. According to [17]. Ash content has to do with mineral materials.

Mineral-shaped inorganic salts. In the combustion process to a temperature of 600°C combustible organic material, whereas inorganic substances not burn. An organic substance that does not burn is called ash, which consists of minerals such as Ca, Mg, Na, P, Fe, Mn, and Cu which determine the quality of a food ingredient. 3.5

Level of Carbohydrate Galamai carbohydrate content of various levels of additional water volume and frequency of milk mechanically grinding squeeze on processing gives a significantly different effect, range water content of 12 treatments over is 62.317% - 70.533%. Carbohydrate analysis done by different methods, of 12 International Conference on Sustainable Agriculture IOP Conf.

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Figure 2. Levels of Carbohydrates Galamai 3.6 Cooking Duration Duration of cooking of various levels of additional water volume and frequency of milk mechanically grinding squeeze on traditional food processing galamai of 12 treatments give significantly different effect. For more details can be seen in Figure 3. From Figure 3.

It can be seen that there increase the length of time of cooking along with the increasing addition of additional volume of water. In the treatment A1 grated coconut comparison with **the volume of water** with the addition of various frequencies addition of water tend to be shorter time compared to the other treatment.

Is **the higher the water** content increases long cooking time galamai, because it takes considerable time to evaporate the water content of the material in part bound either freely or bound water. According to [17] Water in food acts as a solvent of some components besides that it participated as a reagent, while the shape of water is found as free water and bound water. Free water can easily be lost in case of evaporation or drying, while the bound water is difficult freed in this way.

Actually, the water can be physically bound by kapiller system and chemically bound water, such as water and water-bound crystal dispersion system. Figure 3. Cooking Duration of Galamai **International Conference on Sustainable Agriculture** IOP Conf. Series: Earth and Environmental Science 327 (2019) 012018 IOP Publishing doi:10.1088/1755-1315/327/1/012018 6 3.7

Yield Based on Figure 4 it can be seen that there is a tendency to increase the yield in line with the increasing addition of additional volume of water. In the treatment A1 grated coconut comparison with **the volume of water** with the addition of various frequencies addition of water tend to be shorter time compared to the other treatment. Besides, the low yield of the treatment due to the lack of a required amount of **coconut milk to dissolve** sticky and to finalize the dough.

So some sticky dough on the container and the resulting galamai less shiny. In contrast is **the higher the water** content semangkin long cooking time and tends semangkin galamai high water content galamai. High water levels lead to rancidity due to hydrolysis reaction. Figure 4. Rendemen of Galamai 4.

Conclusion From this study it can be concluded that the various levels of **additional water volume and frequency of** cocounut milk mechanically grinding squeeze on traditional food processing galamai significantly affect the fat content, water content and level of karbohydrat, but has no effect on protein content and ash content of galamai.

There is a tendency of increase is the higher volume of water and the lower the frequency of extortion causing galamai the lower the levels of fat and water content is the higher. Of the 12 treatments have turned out with the addition of water up to twice the weight of grated coconut give the highest water content and pass National Standard

SNI 01-2986-1992.

As for treatment with grated coconut comparison: volume addition of water (1: 1/2) and various frequency grinding the resulting yield is relatively lower than other treatments because of insufficient milk to disperse the dough so that the dough is sticky. The treatment provides the best value is A2B3 treatment with grated coconut comparison: volume addition of water (1: 1) and the frequency of milling three meet the Indonesian National Standard SNI 01-2986-1992. Results of analysis of 10,600% fat content, protein content of 3.410%, 17.660% moisture content, ash content of 1.330%, and the carbohydrate content of 67, 5%. With long cooking 138.3 minutes and the yield of 67.5% References [1]. Astawan, M., dan M. W. Astawan. 1991.

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