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Study of Phenol Content and Total Acid Product of Se'i Tuna Using Gradual Smoking Method with Resting Interval

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ABSTRACT

Processed products from tuna which are products from smoked tuna fish using gradually smoking methods resulted from the combustion of kesambi wood and resting interval. The purpose of this study was to analyze the phenol content and the total acid product of tuna produced using a gradual smoking method with resting interval. The research method used is experimental method and the design using a randomized block design with the treatment being tested is smoking without resting interval and smoking with an interval of 10 minutes and 20-minutes interval periods. The variables measured were phenol and total acid levels. The results showed that the average value of phenol levels ranged from 563.82-967.93 mg / g per samples and total acids ranged from 216.84 to 224.57 ml /g.

Key words : *Gradual application, Rest interval, Tuna, phenol, Total acid*

Introduction

Fish is a source of high-quality food, especially because fish contain a lot of protein that is needed by the human body. This deterioration of quality is caused by the action of enzymes and the action of decomposing microorganisms, both of these actions describe the constituent components of fish body tissue so as to produce physical changes such as fish meat being soft and chemical changes that produce volatile and foul-smelling compounds (Murniyati and Sunarman 2000). Therefore, we need an appropriate processing and preservation method to hamper the process of deterioration in quality. One way to maintain quality deterioration is by smoking. Smoked fish products in Kupang City better known as se'i tuna, in general are still carried out traditional smoked using wood from kesambi. Smoke is one way to preserve fish to prevent spoilage and to maintain its nutritional value. Smoke works to add specific flavors and colors to food and acts as an antibacterial and antioxidant (Adawiyah, 2008). Se'i tuna can be made by gradual fogging with resting time intervals. The purpose of gradual fogging and resting time intervals is to get a product that is evenly dry and also gives an opportunity for phenol compounds, formaldehyde, acetic acid, produced from the burning of wood, will be attached to the surface of fish meat and then penetrate in the fish meat. Phenol (C5H6OH) is a compound that is

highly expected in smoked fish products because it can provide a preferred taste and aroma (Meko, 2001). Subsequently (Hutomo, 2015) states that the smoke compounds which have a great role as antimicrobial, flavor enhancer, aroma and prolong the shelf life of smoke products are phenol and acetic acid compounds, their role increases when the two compounds are present together. According to Swastawati *et al.* (2006) phenol compounds act as flavor enhancers, aroma, while acidic compounds act as inhibitors of microbial growth so as to extend shelf life. Based on research by Birkerland *et al.* (2005) an increase in phenol levels and total acid, occurs due to the stages, temperature and duration of fumigation, the higher the temperature, time and stages of fumigation, the higher the phenol compound and acid compound produced. Furthermore according to Ghazali and Swastawati (2006), the amount of phenol content and total acid will be influenced by the processing process such as the length of fogging time, the composition of the smoke, the distance of the smoke source to the raw material, smoke thickness, wood species, stages of fumigation and other fumigation conditions. While acid compounds according to Meko (2001), states that the accumulation of acid compounds in fish meat is influenced by the stages of fumigation, how to smoke and interactions with fumigation. Research Refialy (2008) on the characteristics of smoked tuna (se'i tuna) processed using different resting time intervals shows that the treatment of resting time intervals greatly influences the increase in phenol levels.

Materials and Methods

The main materials in this study are ingredients for processing se'i tuna: loin tuna, fresh water, ice, pepper, salt, plastic samples, wood of kesambi and kesambi leaves. Materials for testing: gallic acid, ciocalteu follicular reagents, 96% ethanol, Na_2CO_3 solution, distilled water. Tools for processing tuna se'i products: table, stainless steel knife, cutting board, basin, blender, gloves, apron, mask, haer net, oven with rack, tray, clock and thermometer. Tools for testing are: porcelain cup, mortar, pestle, aluminum foil, glass beaker and spectrophotometer.

Research methods

Preparation of tuna, washed with water to remove the remnants of impurities that are still attached to the meat of the fish. Tuna loin was weighed for each treatment of 400 g and for the whole treatment as much as 1200 g. Loin is washed with running water to remove blood and other impurities. The salted loin was drained and grained in a seasoning mixture of 0.5% salt and 0.25% pepper then left for 20 minutes. Tuna loin was placed on the smoked rack with the smoking temperature range of 70-90 ^oC, fish loin was smoked according to the experimental unit that was tried, loin was smoked for 240 minutes. Testing phenol levels and total acid.

Test Variables

The variables observed in this study include observations by chemical tests (objective), including tests of phenol and total acid levels.

Testing phenol levels

The phenol content testing method uses the spectrophotometer method according to Wiladi, (2005) in Tia (2019). The initial stage of the phenol content test according to these instructions is to make a standard solution that will be used for analysis in the following way:

1) A solution of 0.1 potassium bromates, made from 1.392 g of potassium bromate, is dissolved in distilled water to 500 ml.
2) A 3 M sulfuric acid solution was made by measuring 16.67 ml of concentrated sulfuric acid (97%) then dissolved in water to 100 ml.
3) Sodium thiosulfate 0.1 N solution, made by weighing 24.8 g then dissolved with distilled water to 1 liter and cooked to boiling.
4) Next weigh 50 g of the shaved sample and then blend.
5) Weigh 5 g of sample that has been blended and put into a measuring flask.
6) The solution is taken using 25 ml pipette, and put into Erlenmeyer.
7) Then add 25 ml of potassium bromate solution and 5 ml of 3 M sulfuric acid, leave for 15 minutes. After that, 2 g of potassium iodide and thiosufate 0.1 N are added to the solution until the solution turns bright yellow, until the solution becomes clear.

The amount of phenol is calculated using the following formula:

$$\text{Phenol levels} = \frac{(25 - t)0{,}1568}{a}$$

Where: t = Milliliter titrant
a = sample weight

2. Testing of Total Titrated Acid (TAT)

TAT testing using the titrimetric method of 10 ml sample was taken with a volumetric pipette, then put into a beaker after which it was given 3 drops of pp, then titrated with 0.1 M NaOH solution until a permanent pink color. The amount of NaOH volume used is recorded and calculated the value of Total Titrated Acid, with the formula:

$$Total\ itrated\ acid = \frac{NaOH\ Volume \times n\ NaOH \times 90}{sampel Volume \times 1000} \times 100$$

Data analysis

Data on the results of phenol levels and total acid obtained will be analyzed using analysis of covariance (ANOVA) to determine the effect of the treatment being tried, then proceed with Duncan's Multiple Range test to determine the difference between treatments as directed (Gazpers, 1991).

Results and Discussion

Phenol Levels

The results of the diversity analysis showed that the treatment of different rest time intervals had no significant effect (P <0.05%) on the phenol content of sei tuna products.

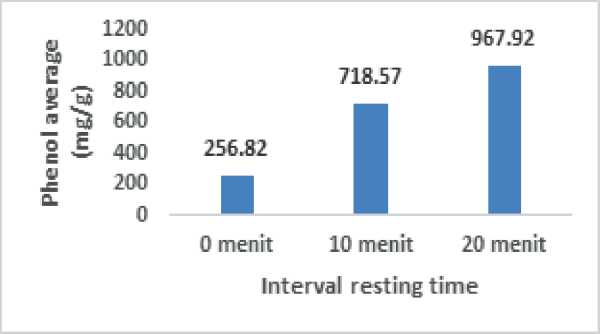

Figure above shows that the average of phenol content of se'i tuna products using the method with resting time intervals for each treatment tends to increase in line with the rest time intervals. The average of phenol levels of tuna se'i products without resting intervals is lower than that of resting intervals of 10 and 20 minutes. The increase in phenol content is thought to be caused by the treatment of a 20-minute rest interval that allows the material to reach the water balance point for water content. When the material reaches the equilibrium level of the water content, the surface of the material which was originally dried due to the influence of the smoke temperature will return to moisture. This causes the composition of the smoke which contains phenol to adhere to the fish meat. Garbatov *et al.* (1971) in Meko (2001) stated that the sticking and penetration of the smoke component (phenol) on the surface and into the material will be faster if the surface is moist during fumigation. In the treatment without intermission intervals showed that phenol levels were relatively low at 563.83 mg/g. This is thought to be due to the influence of temperature and no resting time intervals were given during fumigation, this causing the surface of the fish meat to harden resulting in a smoke compound like phenol having no space to penetrate into the fish meat so that the phenol compound was only attached to the outer surface of the fish meat. Meko (2001) states that the factor that influences phenol levels is the smoking temperature. Where when the fish meat hardens then the process of penetration of phenols in fish meat runs slowly. Water content also greatly affects the low levels of phenols in fumigation products, where high water content then the phenol content in the product has decreased (Meko, 2001). Based on research by Birkerland *et al.* (2005) in Swastawati (2006), an increase in phenol levels, occurs due to temperature, the higher the temperature, the higher the phenol produced.

Total Acid

Examination results and the average value of total acid using the stepwise fogging method with intermittent intervals ranging from 216.84 to 224.57 ml/g. The results of the analysis of diversity, showed that the treatment of different rest time intervals had no significant effect (P <0.05%) on total acid sei tuna products. The unreal effect is thought to be due to the relatively short interval of treatment. Graph of the average total acid.

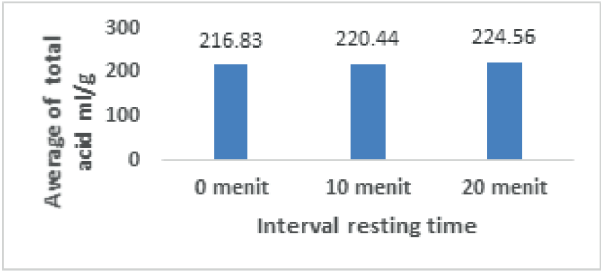

Figure above shows that the treatment of the use of intervals affects the total acid of se'i tuna products. The lowest average total acid value was obtained in the treatment without a resting time interval of 216.84 ml/g. While the highest total acid content was obtained in the fumigation treatment using a break interval of 20 minutes, namely 224.57 ml/g. Comparison of the increase in total acid in the treatment interval of 10 minutes experienced an increase of 3.62 ml/g from the treatment without the rest interval, while in the treatment interval of a 20 minute rest period there was an increase of 7.73 ml/g. The increase in total acid in tuna se'i products is thought to be due to high phenol levels. Darmadji (1995) in Andika (2014) states, the higher the phenol content, the smoke will become more acidic. The main acid compounds found in smoke include: amenusam formiat, acetate, butyrate, caprylate and isoovalerate. Furthermore, according to Meko (2001) states if phenol levels increase, the total acid will increase as well. This is due to phenol compounds in general, including acidic compounds. The increase in acid compounds in tuna se'i products is presumably because the treatment of resting time intervals can provide an opportunity for acid compounds to penetrate into fish meat. Meko, (2001) states that total acid increases with the number of fumes given. The accumulation of acid in fish meat is influenced by the stages of fumigation, fogging methods and interactions with fumigation.

Conclusion

Based on these studies, it can be concluded that the sei tuna product which is processed using the gradual fogging method with intervals time, an increase in phenol compounds and total acid in line with the provision of intervals time. For the value of phenol levels ranged from 563.83-967.93 mg / g or 0.56-0.096%, while the total acid value ranged between 216.83-224.56 ml/g.

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