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Garlic Antioxidant (*Allium sativum L.*) to Prevent Meat Rancidity

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Abstract

A study conducted to determine antioxidants ability of garlic applied in beef fat. Garlic's antioxidants determination has the result in water immersion about 53,66%. The study used a completely randomized statistically design with 5x5 factorial. The first factor was the level of crushed garlic (0, 3, 6, 9 and 12% in w/w) then the second factor for storage time (3, 6, 9 and 12 days) at refrigeration temperature (3-5°C). Thiobarbituric acid value (TBA) and beef fat level percentage were evaluated. The results show that there was an interaction ($P < 0.05$) between the value of TBA and beef fat level percentage. Garlic crushed could reduce the level percentage of beef fat and slowdown the increasing TBA values during storage at refrigerator temperature.

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INTRODUCTION

Meat is one of nutritious food comes from cattle aside of milk and egg which contain protein, lipid, ash and carbohydrate. [4] was explained that meat containing 66.10 -69.30% of water, 18.40-21.20% of protein, 8.30-12.30% of lipid and 0.90-1.20% of total ash. Therefore, [19] supported these statement by the study that the average percentage of meat lipid on the range 14.40%.

Meat is categorized as a perishable food due to fat rancidity. Fat rancidity caused by the reaction between

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fatty acid chain and oxygen exposure [21]. Undesirable rancidity flavor produced by the decomposition of lipid forming peroxide and aldehyde compound [10]. [18] were explaining the determination method of fat rancidity through TBA (thiobarbituric acid) value. The rancidity of fat contained malonaldehyde which determined by destillation is then to be reacted with thiobarbituric acid. [16] reported that the TBA value of fresh beef ranged from 0.61 to 0.69 mg / kg, whereas [8] reported that freezing meat could decreasing the TBA value. The frozen beef's TBA values ranged from 0.27 to 0.41 mg / kg.

One of the methods for meat processing is garlic beef marination. Garlic beef marination is could prevent beef fat rancidity and decreasing fatty acid oxidation. [11] reported that garlic pork marination for the concentration 3 and 6% could reduce fatty acid oxidation during storage at 4° C for 7 days. The reaction occurs between allinase and allin from garlic is happened when garlic got physical treatment such as injury, crushed and cut then forming allicin (diallyl thiosuphinate) or 2-propenyl-2-propenethiol sulphinate) for less than 10 seconds [2]. [12] were explaining that allicin is unstable and quickly degraded into various sulfide compounds, which further contributes to flavor. According to [5] organosulfur compounds (alliin, diallylsulfide, allylsulfide and propylsulfide) have the capability as fat antioxidants. Garlic also contains antioxidant compounds such as tocopherol [7], selenium [6], butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA) and tert-butylhydroquinone (TBHQ) [5].

The expected output and contribution of this study is to provide information regarding the natural preservatives antioxidant from garlic. The outcome of the study to obtained the data regarding the value of garlic antioxidant to prevent meat rancidity as a natural preservative.

MATERIALS AND METHODS

Completely randomized design in 5x5 factorial with three replications was used for this study. The first factor is concentration level of crushed garlic for beef marination (started from 0, 3, 6, 9 and 12% of the weight of beef). The second factor is the storage time (0, 3, 6, 9 and 12 days) at refrigeration temperature storage (3-5°C with the relative humidity 55-65%). Variable examined was fat contain with the procedure analysis according to [13] and the procedure for examined the TBA values according to [18]. The data obtained were then analyzed using variance analysis. When there is any significancy then continued with Duncan's multiple range test [17]. Oxidation activity of garlis were examined using Gorinstein method [7].

RESULTS AND DISCUSSIONS

The results shows that there was an interaction ($P < 0.05$) between the level of garlic crushed and period of time storage at refrigeration temperatures on fat content and TBA values of beef. The data are presented in Table 1 and Table 2. Results of this study indicate that the higher level concentration of the garlic crushed have positive influence for lowering the levels of fatty acid oxidation, thus it could lowering the TBA value of beef. On the other hand the period of storage time at refrigeration temperature had gave the negative effect, because it increases the rate of fatty acid oxidation, thereby increasing the value of TBA on beef. While the fat content decreased due to the level of garlic crushed and the period of storage time at refrigeration temperatures.

Garlic crushed tends to lower beef fat content and slower increasing TBA values during storage at

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