International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.4, pp 582-585, 2017

Antioksidan Activities and Colour of Meatball With secang Wood (*Caesalpinia sappan L.*) Extract

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Abstract : Oxidation is one of the important factors that affect the quality of meat products including meatballs. To inhibit oxidation, necessary to add material in the processing that act as antioxidants. one of the plants that serve as natural antioxidants is *Caesalpinia sappan L*. because the content of phenols, flavonoids, and brazilien very high. This study aimed to determine the effect of extracts of *Caesalpinia sappan L*. of antioxidant activity and color meatballs. The experiment was conducted with completely randomized design with factors such as the level of extract of *Caesalpinia sappan L*. (0, 3, 6, and 9%). The results showed that *Caesalpinia sappan L*. able to increase the antioxidant activity but do not produce meatballs with good color if the level is too high.
Key Words : Oxidation, Antioxidant, *Caesalpinia sappan L.*, Colour, Meatballs.

Introduction

Meatball is a meat product which preferred by consumers. This is due to taste, form, and presenting meatballs. Consumer preferences are influenced by the quality of ingredients, how to manufacture, storage, and presentation of the product. Model of meatballs preparation consists of two kinds of fresh and frozen. Fresh meatball can be directly consumed by consumers a moment after manufacture, but can not last long at room temperature. An attempt to overcome these obstacles is to frozen storage. Frozen meatball can last long with some properties changes. All changes is frozen storage purposesexcept the changes (oxidation) of lipid[1].

Lipid oxidation will produce a variety of volatile compounds that caused rancid, off-flavo, high cooking loss of the product, decreased nutritional value and storage life, as well as the accumulation of some toxic compounds capable of interfering with the health konsumen[2,3,4]. Therefore, the oxidation should be controlled and even prevented with the use of antioxidants.

Some research suggests compounds that have the potential of antioxidants including flavonoids, phenolics, and alkaloids. Flavonoids function neutralize free radicals thus minimizes damage to cells and tissues. One of the plants that high flavonid is *Caesalpinia sappan L*. Besides a role in preventing rancidity, antioxidants also has the potential to improve the quality of products. Therefore, the addition of *Caesalpinia sappan L*. extracts expected to increase antioxidant activity and color of meatballs.

Materials and Methods

Materials

This study use the meat of Longissimus dorsi muscle type Bali male cattle aged 2.5 - 3 years. Materials for the manufacture of Caesalpinia sappan L. extract is Caesalpinia sappan L., water, maltodextrin, and filter paper while making meatballs is starch as fillers, salt, ice cubes, flavors ingredients (pepper and garlic). Materials for testing the characteristics and antioxidant activity DPPH solution of the meatballs is 20 ppm, methanol, distilled water, and reagents TBA. The tools used in this study is a food processor, stoves, boiling pans, basins, knife, water bath, micropipette, petri dishes, blender, measuring cups, spectrophotometric, colormeter, distillation equipment, and others.

Methods

The experiment was conducted use completely randomized design with a level of *Caesalpinia sappan L*. extract as a treatment and three replicated. The levels were 0, 3, 6, and 9% of the weight of meat. Creation phase consists the manufacture of *Caesalpinia sappan L*. extract powder, making meatballs, and parameters test.

Manufacturing of Caesalpinia sappan L. Extract Powder

Caesalpinia sappan L. extract prepared by the infundation method with comparison of wood and distilled water 1 gram: 5 ml. Flouring performed with the addition of maltodextrin in *Caesalpinia sappan L*extract as 1: 1.

Manufacturing of Frozen Meatballs

Manufacturing of meatballs phase consists of trimming, materials measurement, the addition of extract (0, 3, 6, and 9%), grinding, mixing the ingredients, forming, cooking, and storage for 14 days.

Parameters Test

DPPHtestsaims to determine the parameters concentration gives 50% effect equivalent antioxidant activity (IC50). The existence of antioxidant compounds can be determined by DPPH solution color change from purple to yellow[5].

TBA numbers measurement is performed to determine the occurrence of rancidity by measuring the levels of malonaldehida formed. Measurements use rancidity intensity analysis through methods Thiorbarbituric Acid Reactive Subtances (TBARS). Distillate absorbance was measured at a wavelength of 528 nm with the blank solution as the zero point. The reference solution made of a mixture of 5 ml of distilled water plus 5 ml reagent TBA. Numbers TBA malonaldehyde expressed in mg per kg of sample[6].

The color of the meat can be measured using the Hunter color system (L *, a *, b *). Color measurements with this method is much faster with fairly good accuracy. In this system the term assessment consists of three parameters: L *, a *, and b * [7].

Results and Discussion

The addition of extract were significantly ($P < 0.01$) increase the DPPH value of meatballs. DPPH value showed antioxidant activity in inhibiting oxidation. This capability is very useful in preventing damage to the meatballs. The high antioxidant activity of themeatballs with secangextract because of the high content of flavonoids, phenols, and brazilien. Secang extract containing five active compounds of flavonoidsthat act as antioxidants.component compoundbioactive in *Caesalpinia sappan L*., which brazilin, brazilein, 3'-O-metilbrazilin, sappanone,chalcone, sappancalchone and other common components, such as amino acids, carbohydrates and acidspalmitate which are relatively very small[8].

The antioxidant activity of secang wood is high due to the content of brazilien, flavonoids and phenols it contains. There is a high correlation between total phenol and antioxidant activity, total phenol which plays a

major role in contributing to the antioxidant activity[9]. High phenol levels will increase the availability of hydroxyl groups capable of trapping free radicals[10].

Secang wood extracts level is very significant (P <0,01) to value TBA meatballs. TBA value gets smaller in line with increasing added level secang extract. The addition of materials that function as antioxidants capable of inhibiting the oxidation of fat by the oxygen on the meatballs so that the resulting TBA value does not exceed the specified threshold[11]. Antioxidants capable of slowing or prevent the oxidation of which radicals tend to react with antioxidants than with other molecules[12].

The highest of secang extract level (9%) is very significant make decreased brightness values of meatballs produced, while the meatballs with the extract level 0, 3, and 6% have the same brightness. A low brightness value of adding pigment extract of secang because the interaction secang wood with tapioca flour in making meatballs.Meatballs with addition of extract 0, 3, and 6% had values statistically the same reddish while the meatballs with a 9% extract has a value that is very markedly lower. secang extract level is not significant (P> 0.05) on a yellowish color meatballs.Yellowish value meatballs by adding secang extract not significantly different with meatballs without the addition of extract. Secang extract used in this study were light orange extract powder and showed that the extract is at acidic conditions.

In the model of food containing carbohydrate, observation of the interaction of pigment in extracts obtained from secang wood of food containing starch, showed clumping phenomena purple color in the solution[13]. Secang wood extract treatment mincemeat cause color of the meat towards brown. Tapioca flour which has a slightly acidic pH causes the color of the solution turned out to be a reduced intensity of the red color when mixed secang extract[14]. Secang wood extracts becomes yellow when it is in a solution having a pH of acidic[11].

Conclusion

The addition of *Caesalpinia sappan L.* extract can increase the antioxidant activity seen with the high value of DPPH and low value of TBA but it does not improve the color quality of the meatballs.

Acknowledgements

The authors are very grateful to all those who have helped in the conduct of research.

Table 1. The antioxidant activity and color meatballs with extracts of secang

Parameter	Secang Extracts Level (%)			
	0	3	6	9
DPPH (%)	52,12±0,31^{d}	85,67±0,26^{c}	88,69±0,38^{b}	89,93±0,51^{a}
TBA (mgMDA/Kg)	0,074±0,02^{c}	0,027±0,01^{b}	0,015±0,01^{a}	0,008±0,01^{a}
L*	39,94±0,05^{a}	39,91±0,05^{a}	39,91±0,05^{a}	39,81±0,03^{b}
a*	2,45±0,19^{a}	2,38±0,10^{b}	2,29±0,06^{c}	2,22±0,07^{d}
b*	14,06±0,08	14,09±0,11	14,09±0,13	14,04±0,05

Different superscripts in the same row showed a highly significant difference (P <0.01)

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