ICTAFF 2018

International Conference on Tropical Agrifood, Feed, and Fuel

Sustainability of Food, Feed, and Fuel Tropical Resources for Quality Future

PROCEEDING

Samarinda, 13-14 November 2018
MESRA Bussines Hotel

PROCEEDING

INTERNATIONAL CONFERENCE ON TROPICAL AGRIFOOD, FEED, AND FUEL (ICTAFF) : SUSTAINABILITY OF FOOD, FEED, AND FUEL TROPICAL RESOURCES FOR QUALITY FUTURE

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Department of Agricultural Products Technology
Agriculture Faculty, Mulawarman University
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PREFACE

The greatest regards should be expressed only to God the Almighty, Allah SWT. We have finished the Proceeding book of International Conference on Tropical Agrifood, Feed, and Fuel (ICTAFF) after the conference which was held on 13-14 November 2018 in Mesra bussines Hotel Samarinda.

The conference takes "Sustainability of Tropical Food, Feed, and Fuel Tropical Resources for Quality Future" as the main theme.This international conference is aimed at resolving problems and bringing together scientists, researchers, professionals, and students from multidisciplinary agriculture-related fields to share the latest findings or ongoing research activities.

There are 6 sub themes emphasized in the ICTAFF 2018, including halal, safe, and healthy food, improving quality food and nutrition, security and sustainability food and agriculture, innovation in feed technology to increase animal production, sustainable and renewable fuels based on tropical resources, and empowering of agribusiness based on community.

We would like to thank all keynote speakers for their contributions to the Conference, they are Asst. Prof. Dr. Somsak Maneepong from Walailak University Thailand, Prof. Xuming Huang from South China Agricultural University, Prof. Irwandi Jaswir from International Islamic University Malaysia (IIUM), Prof. Ali Agus from Gadjah Mada University, Dr. Dadan Rohdiana from Research Institute of Tea and Cinchona Indonesia, and Widi Sunaryo, Ph.D from Mulawarman University Indonesia.

Finally, we would like to thanks all of the proceeding team who have dedicated their constant supports and countless time to bring these scratches into a book. The ICTAFF 2018 proceeding is a credit to a large group of people, and everyone should be proud of the outcome.

Editors

Welcome Speech

Welcome Note From ICTAFF 2018 Committee

Assalamu'alaikum Warahmatullah Wabarakatuh

I would like to express the greatest regard to the Almighty God, Allah Subhanallahi Wa Ta'ala, for the Successful of International Conference of Food, Feed and Fuel 2018. I also would like to welcome all the audiences to Samarinda Kota Tepian.

Food security is very important to strengthen and support sustainable development in agriculture. Food, not only from plant but also from animal, should be available for all resident of Indonesia. It is urgent to provide quality feed to support food animal development to fulfill people needs of nutrition.

We would like to report that about sixty participants are attending the conference. Researcher and lecturer from some universities and research institutions will disseminate their research in this conference.This number is beyond our expectation when we were arranging the conference.

This conference will present international speakers from Wailailak University, Associate Professor Somsak Maneepong, Prof. Irwandi Jaswir from International Islamic University of Malaysia, Prof Xuming Huang from South China Agricultural University, Prof Ali Agus from Gadjah Mada University, Dr. Dadan Rohdiana from Research Institute of Tea and Cinchona Indonesia, and last but not least, Widi Sunaryo, Ph.D from Mulawarman University.

The morning session is designed to keynote speeches and the afternoon session is for parallel sessions. The parallel sessions will be focused into six topics: Halal, safe and healthy food; Security and sustainability of food and agriculture; Innovation in feed technology to increase animal production; Sustainable and Renewable fuel based on tropical resources; and Empowering of agribusiness based on community.

Faculty of Agriculture as conference organizer would like to thank Agrivita, the Journal of Agricultural Science on an agreement for publication of the selected papers from ICTAFF participants, and special thank Dr. Haviludin for helping our communication to the agreement. I also would like to thank to STIPER Kutai Timur, especially Prof. Juraemi, for cooperation in organizing and special thanks to PT. Kaltim Prima Coal and PT. Pupuk Kaltim for strong support to this conference.

We hope you will enjoy the tropical climate as long as staying in Samarinda. Thank you

Wassalamu'alaikum Warahmatullah Wabarakatuh

Committee,

Aswita Emmawati
Chairman

CONTENTS

THE EFFECT OF ADDITION MANGROVE FRUIT EXTRACT (*Sonneratia Sp*) ON ORGANOLEPTIC QUALITY AND ANTIOXIDANT ACTIVITY OF PASTEURIZATION COW'S MILK

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ABSTRACT

The objectives of this study were to determine the effect of the addition of mangrove fruit extracts in dairy products to antioxidants level and consumer preferences. This research using Completely Randomized Design (RAL) which 4 treatments group (mangrove fruit concentration extract 0%, 5%, 10% and 15%) and 5 replication. Parameters measured in this study were hedonic scale, hedonic quality (color, flavor, and taste) and antioxidant activity on the product. The data were analyzed used Kruskal Wallis for hedonic scale and quality as well as the Least Significant Difference test (LSD) for antioxidants. This research shows that quality and hedonic scale (flavor and aroma) give significant effect with value $P < 0,05$. While on the quality test and hedonic scale (color) and antioxidant activity did not give a significant effect. The addition of 5% mangrove fruit concentration extract on cow pasteurized milk was preferred by panelists. The result of hedonic quality tested analysis produce white color with a favorite value of 2,1 (like to rather like), sweet taste with favorite value 2 (like) and slightly mangrove-scented with favorite value 2,26 (like to rather like). The results show that the highest antioxidant activity was shown in the addition of mangrove fruit extract concentration of 15%, that is 25,7% compared to cow pasteurized milk without the addition of mangrove fruit extract that has a lower antioxidant activity that is 7,77%.

Keywords: mangrove fruit extract, pasteurization milk, organoleptic quality, antioxidants quality

INTRODUCTION

Fresh milk contains complete and balanced food substances such as proteins, fats, carbohydrates, minerals and vitamins that are needed by humans. The high nutritional value of milk causes milk to be a medium that is highly sought after by microorganism for its growth and development. The microorganisms that develop in milk are also the final part. Handling improper milk can also help to be faster and cheaper, so processing and preservation need to be done. Processing and preservation of milk are carried out with the aim of the shelf life month (Jamila, 2006).

Dairy products with various types have been widely distributed in Indonesia, some examples of processed milk are: Ultra High-Temperature milk (UHT), pasteurized milk, powdered milk, sweetened condensed milk, and ice cream. Some time ago the use of natural ingredients is a trend in milk processing.

Mangrove is one of the many natural ingredients in East Kalimantan. East Kalimantan has a mangrove forest of 883,379 ha (Dammayanti, 2011). Many studies have developed to test the efficacy and usefulness of consuming *Sonneratia Sp*. Antioxidants are one of the focuses of research that is often done in mangrove plants. Antioxidants in mangroves in plant adaptation to abiotic and biotics (Vranova et al., 2002). The antioxidants produced by plants are secondary metabolites that can be used as simple and complex phenolic compounds (Dixon and Paiva 1995). Besides having an important role in plants, antioxidants also have benefits for humans. Benefits that can be relied upon by eye organs, lung function, and neural network function (Dickinson 2002). Research related to the utilization of mangrove fruit (Sonneratia sp) in dairy products is still relatively small. This research is to produce healthy beverage products that are rich in antioxidants with raw materials of pure cow's milk and fortified with mangrove fruit extract.

MATERIAL AND METHODS

This research was conducted in October-December 2017. Preparation of pasteurized cow milk with the addition of mangrove fruit extract and the organoleptic test was carried out at the Laboratory of Animal Husbandry Production and Technology, Department of Animal Husbandry, Faculty of Agriculture, Mulawarman University. Antioxidant activity tests have been carried out in

the Chemical Laboratory of the Department of Agricultural Product Technology, Faculty of Agriculture, Mulawarman University.

The materials used in this study were: pure cow's milk, mangrove fruit, DPPH (1,1-diphenyl-2-picrylhydrazyl) reagent, tissue, filter paper, 96% ethanol, aquades, and mineral water. The tools used in this study are basin, knife, blender, beaker glass, spectrophotometer, vortex, micropipette, stove, test tube, analytic scale, pan, stirrer, measuring cup and aluminum foil.

The design used in this study was a completely randomized design (CRD) with four treatments and six replications.

Treatment 1: Cow's milk without mangrove extract

Treatment 2: Cow's milk by adding mangrove extract as much as 5%.

Treatment 3: Cow milk with the addition of mangrove extract as much as 10%.

Treatment 4: Cow's milk with the addition of mangrove extract as much as 15%.

Research Procedure

Preparing Milk and Mangrove Samples

The cow's milk sample used in the study came from Holstein Friesian Cattle in PESAT Livestock PT KPC Sangatta East Kalimantan. The mangrove fruit samples used came from Tanjung Laut, Bontang City, East Kalimantan.

Making mangrove fruit extracts.

Making mangrove fruit extract begins with the collection of material (mangrove) after the mangrove is separated between leaf branches and fruit petals so that only fruit remains after which the mangrove is washed, the washing process aims to make the mangrove fruit clean and hygienic. After washing, weighing as much as (2 kg) of mangrove is then carried out and then added 2 liters of water and blended. After that, the mangrove fruit that has been destroyed is filtered using filter paper and mangrove fruit extract is obtained (Diantoro et al., 2015).

Making pasteurized milk with the addition of mangrove fruit extract

Fresh cow's milk was added by mangrove fruit extract as much as 5%, 10%, 15% and fresh milk without being given mangrove fruit extract as a control. Then the mixture of the solution is added as much sugar (10%), then pasteurized by the method of LTLT (Low-Temperature Long Time) with a minimum temperature of 60 0C for 30 minutes.

Organoleptic Test

The evaluation criteria tested were in the form of color, taste, aroma, and preference. Organoleptic tests consisted of 25 semi-trained panelists (Kartika et al., 1999). Indicator scales assess color, taste, aroma, and preference (1-5) (Setyaningsih et al., 2010)

Table 1. Hedonic Quality Test

No	Colour	Taste	Flavor
1	White	Fresh milk	Very flavorful milk
2	Yellowish white	Rather sweet	Scented milk
3	White rather cream	Sweet	Not flavorful
4	Yellow	Sweet and sour	A little scented with mangroves
5	Cream	A bit bitter	Scented mangrove fruit

Table 2. Hedonic Scale Test

No	Colour	Taste	Flavor
1	Really like	Really like	Really like
2	Like it	Like it	Like it
3	Rather like it	Rather like it	Rather like it
4	Do not like	Do not like	Do not like
5	Very dislike	Very dislike	Very dislike

Antioxidant Test

Antioxidant tests were carried out using the DPPH method (Kubo et al., 2002). Measurements of antioxidant activity were carried out using the DPPH (1.1-diphenyl-2-picrylhydrazyl radical-scavenging) free radical method. The milk formula consisting of four treatments was used as a sample for testing antioxidant activity. The antioxidant activity of milk was calculated based on its equivalence with the antioxidant activity of ascorbic acid expressed in ppm AEAC (Ascorbic Acid Equivalent Antioxidant Capacity).The antioxidant test procedures are explained below

Sample dilution

The material is weighed as much as 1 g in glass beaker then added with 95% ethanol as much as 10 ml and divots (10-1), then the mixed sample is taken as much as 5 ml and added 96% ethanol as much as 5 ml and vortex (10-2), and repeat until you get the 6th test (10-6).

DPPH dilution: 0.004 g DPPH added 50 ml of 95% ethanol (DPPH 0.2 mM concentration) stored in a dark room.

Blank: 2 ml of DPPH which has been diluted added 2 ml of 95% ethanol. Samples at 10-6 dilutions are taken 2 ml. Added 2 ml of DPPH (and checked) to close the test tube using aluminum foil. Let stand for 30 minutes at a dark room temperature. The absorbance is measured at 517 nm. State Antioxidant Activities in DPPH radical inhibition percentage (scavenging activity)

$$\%\ inhibition = \frac{DPPH\ absorbantion - sample\ absorbantion}{DPPH\ absorbantion}\ x\ 100$$

Data Collection Method

Data retrieval method used in this study milk that has been processed using mangrove extract was tested for antioxidant activity, as well as an organoleptic test (color, aroma, taste, preference) to find out the right amount of mangrove extract and liked by consumers.

Data Analysis

The data obtained in this study were processed using Variance Analysis based on a complete randomized design (CRD) (Gaspersz, 1991) with 4 treatments 6 replications.

RESULTS AND DISCUSSION

Hedonic scale test and Color Hedonic Quality

Pasteurized milk is processing milk by using a heating process with a certain length and temperature. The addition of mangrove fruit extract to pasteurized milk can affect the quality of organoleptic milk. Organoleptic testing of pasteurized milk with the addition of mangrove fruit extracts was carried out on 25 randomly selected panelists. Assessment is done using number 1 as the highest value (very preferred) up to number 5 as the smallest value (very disliked).

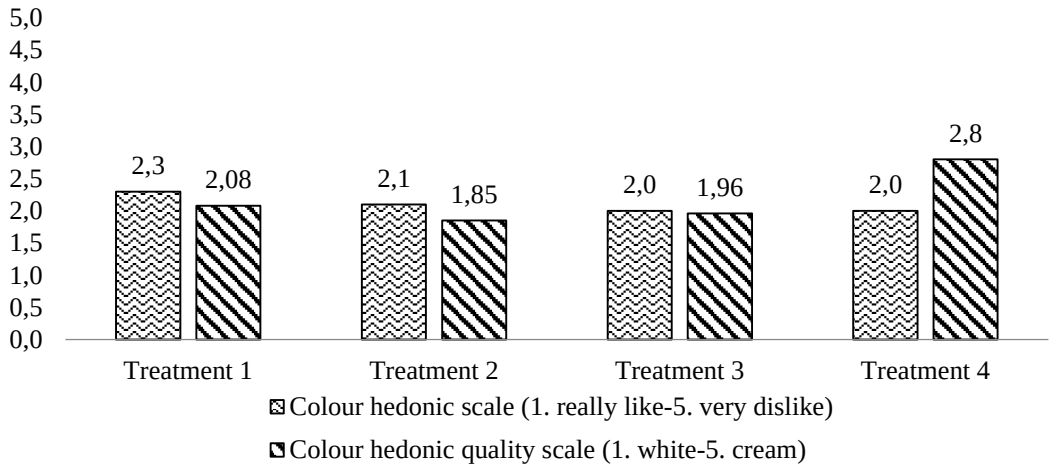

Figure 1. Color Hedonic Scale Test and Color Hedonic Quality in Pasteurized Cow Milk with Addition of Mangove Fruit Extract (*Information: Treatment 1 = Without the addition of mangrove fruit extract; Treatment 2 = Addition of mangrove fruit extract as much as 5%; Treatment 3 = Addition of mangrove fruit extract as much as 10%; Treatment 4 = Addition of mangrove fruit extract as much as 15%)*

The results of statistical analysis on the hedonic scale test and hedonic color quality on pasteurized milk added with mangrove fruit extract showed no significant difference (P> 0.05). The extract produced from mangrove fruit does not have a striking color so the addition of mangrove fruit extract does not change the color of milk. Figure 1 shows that the panelist color hedonic scale test prefers P3 and P4. In the color hedonic quality test, there is the best mean value in the P4 group of 2.8 (yellowish white to white cream). This is inversely proportional to the mean value in the P2 group where the resulting hedonic quality test is equal to 1.85 (white to yellowish white intensity). So that in Figure 3 the best treatment of scale and hedonic quality of color is found in P4 (with the addition of 15% mangrove extract in pasteurized milk).

Color plays an important role in the reception of food. Color can give clues about chemical changes in food (Kartika et al., 1988), color is a characteristic of a material that is thought to originate from the spread of the spectrum of light. someone's a sensory sensation because of the stimulation of a beam of radiation energy that falls into the eye or retina of the eye. If a product has an attractive color, it can cause someone's appetite to try the food. Fennema (1985) adds color to be the most important quality attribute, even though a product has high nutritional value, good taste, and good texture but if the color is less attractive it will cause the product to be less desirable. Color is the first parameter that decreases the level of consumer acceptance of a product. Subjective research with vision is still very decisive in organoleptic testing of color (Fennema, 1985).

Test of Aroma Hedonic Scale and Aroma Hedonic Quality

The results of statistical analysis on hedonic scale scent and hedonic aroma quality were significantly different (P <0.05). Figure 2 shows that panelists prefer P1 which is a control (without the addition of mangrove fruit extract). In the hedonic quality test, the aroma has the best average value, namely at P4 (pasteurized cow milk with the addition of 15% mangrove fruit extract) of 2.82 (milk-flavored to non-flavorful). The change in the aroma in milk pasteurisation is caused by mangrove fruit extract which has an acidic aroma because the pH is very low (acid) which is 3.3. This causes the higher addition of mangrove fruit extracts, it will reduce the fishy aroma of milk.

The flavor is a smell that can be observed with the smell of smell. Odor or aroma testing is one of the important tests because it can provide the results of an assessment of the product's acceptability (Kartika et al., 1998). Aroma has an important function in food products because before consuming usually the aroma of food is smelled by the senses of the nose, if the aroma of the product is too stinging or seem tasteless it will make consumers not interested in consuming.

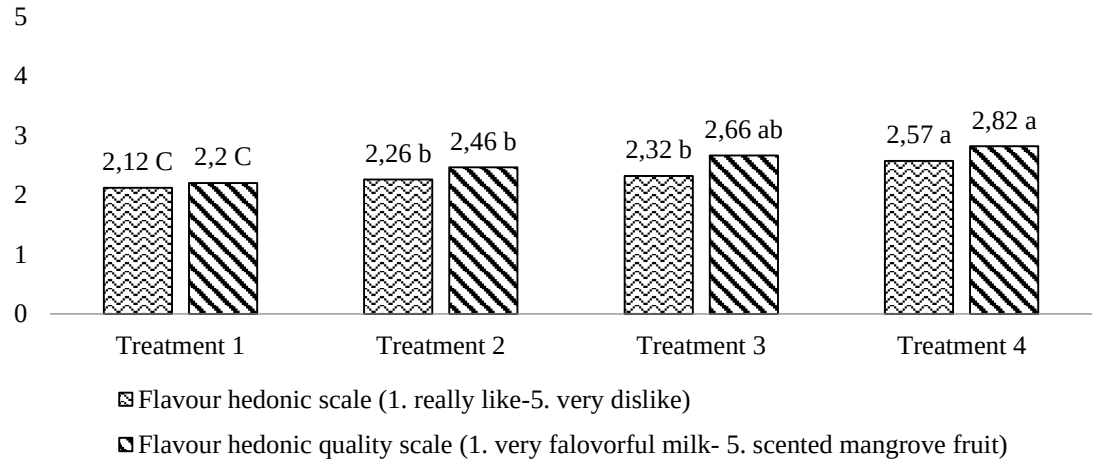

Figure 2. Scales of Aroma Hedonic Test and Hedonic Quality of Scents in Pasteurized Cow Milk with Addition of Mangove Fruit Extract. *Information: Treatment 1 = Without the addition of mangrove fruit extract;Treatment 2 = Addition of mangrove fruit extract as much as 5%;Treatment 3 = Addition of mangrove fruit extract as much as 10%;Treatment 4 = Addition of mangrove fruit extract as much as 15%*

Test of Hedonic Scale Taste and Hedonic Quality of Taste

The results of the statistical analysis on the hedonic scale test of taste and hedonic taste quality (Appendix 2) were significantly different (P <0.05). Figure 3 shows that panelists prefer P2 which is pasteurized cow milk with 5% addition of mangrove extract. In the hedonic quality test, there is the best mean value at P4 (pasteurized cow milk with the addition of 15% mangrove fruit extract) of 3.51 (sweet to sweet and sour). The low pH of mangroves is very influential on milk so that the higher the concentration of mangrove extracts, the milk will feel sourer. The second treatment of P2 (pasteurized cow's milk with the addition of 5% mangrove extract) became the most preferred by the panelists because the ration was not too acidic but also felt the addition of extracts. The hedonic quality test results on the untreated pasteurized milk will not taste sour while the higher the treatment, the milk will feel sour even at the fourth treatment (P4) with a

concentration of 15% extract the milk feels slightly bitter. Taste is something that is very much considered in making a product. Taste is a stimulus caused by the material eaten, especially felt by the taste buds.

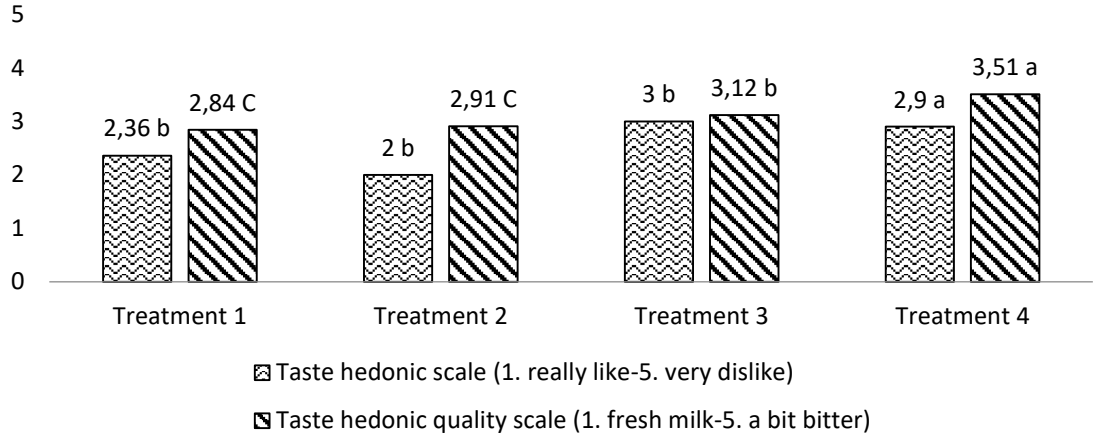

Figure 3. Hedonic Test Scale for Taste and Hedonic Quality of Flavor in Pasteurized Cow Milk with Addition of Mangove Fruit Extract Information: *Treatment 1 = Without the addition of mangrove fruit extract; treatment 2 = Addition of mangrove fruit extract as much as 5%; treatment 3 = Addition of mangrove fruit extract as much as 10%; treatment 4 = Addition of mangrove fruit extract as much as 15%*.

Antioxidants Activity

The results of statistical analysis of pasteurized cow's milk with the addition of mangrove fruit extract (attachment 3) were not significantly different (P> 0.05). Figure 4 shows that pasteurized milk with the highest antioxidant activity is pasteurized milk with the addition of 15% mangrove extract which is equal to 25.7%

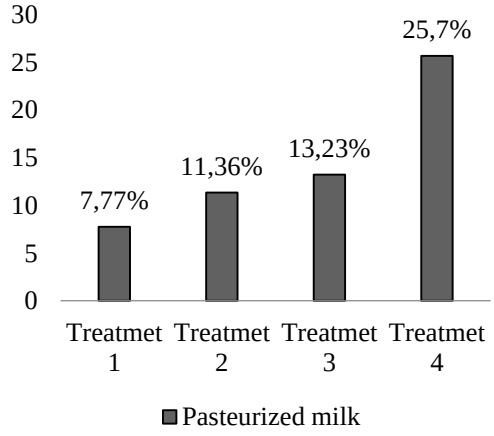

Figure 4. Graph of antioxidant activity in pasteurized cow milk with the addition of mangrove fruit extract.Information: *treatment 1 = without the addition of mangrove fruit extract; treatment 2 = addition of mangrove fruit extract as much as 5%; treatment 3 = addition of mangrove fruit extract as much as 10%; treatment 4 = addition of mangrove fruit extract as much as 15%.*

Analysis of antioxidant activity was carried out using the DPPH method. There are two main types of antioxidants namely primary and secondary antioxidants which are different in their mechanism of action. Primary antioxidants bind free radicals and give a hydrogen or electron atom to stabilize free radicals. On the other hand, secondary antioxidants work by suppressing the formation of free radicals which then prevents oxidative damage (Hue et al., 2012).

DPPH is free radicals at room temperature and accepts radical electrons and hydrogen to become stable molecules. This method has been used to analyze antioxidants such as polyphenols. DPPH is given hydrogen by polyphenols, forming a reduced DPPH. Then the color changes from purple to yellow after reduction, which can be measured by decreasing absorbance at a wavelength of 517 nm (Subramanian, 2013).

Levine et al. (1995) stated that vitamin C is a non-enzymatic antioxidant that is soluble in water. Some forms of antioxidants include vitamins, minerals, and phytochemicals. Vitamins C and E as antioxidants can stop free radical chain reactions. First vitamin E will capture free radicals, but vitamin E then turns into vitamin E radical so that it requires help of vitamin C. Vitamin C together with vitamin E can inhibit oxidation reactions by binding to vitamin E radicals formed in the process of breaking free radical reactions by vitamins E becomes free vitamin E which functions again as an antioxidant (Pavlovic et al. 2005).

Mangroves have a vitamin C content of 56.74 mg in 100 g of mangrove (Salamah, 2013).

Mangroves also function as antioxidants that can capture hydroxy radicals and superoxide then neutralize free radicals so that they protect cells and maintain the integrity of cell and tissue structures and can protect lipid membranes against damaging reactions (Robinson, 1995).

CONCLUSIONS AND SUGGESTION

The addition of mangrove fruit extract to pasteurized cow's milk has a significant effect on the quality and hedonic scale of aroma and taste but has no significant effect on the quality and color hedonic scale. Adding mangrove fruit extract to pasteurized cow's milk can increase antioxidant activity. The highest antioxidant activity was aimed at the addition of 15% mangrove fruit extract which was equal to 25.7% compared to pasteurized cow milk without the addition of mangrove fruit extract which had a lower antioxidant activity of 7.77%.

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