The organoleptic of pasteurized milk by addition of kasumba turate (*Cartamus tinctorius l*) at different storage times

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Abstract. Milk was food that was composed of various nutritional values with a balanced proportion of milk weakness affects the shelf life so that it required a pasteurization process by adding kasumba turate (*Cartamus tinctorius L*) to milk as a natural colouring agent and preservative. To extend the shelf life, this study aimed to determine the effect of organoleptic quality (color, aroma and thickness) pasteurized milk with the addition of kasumba turate (*Cartamus tinctorius L*) at different storage times. This research was conducted using a Completely Randomized Design with different storage duration treatments (0 hours, 4 hours, 8 hours, 12 hours, 16 hours). The results of this study indicated that the addition of kasumba turate significantly affected the viscosity of milk, but did not affect the color, and aroma. This research can be concluded that during the storage of the organoleptic quality of color, the aroma of kasumba turate, the aroma of milk did not change but affected viscosity at different storage times**.**

1. Introduction

Milk is a food ingredient that is composed of various nutritional values in balanced proportions. The high nutritional content in milk is a good medium for microbial growth, so milk is a perishable food ingredient. Factors that cause damage to milk can include chemical, physical, and microbiological factors [1]. However, damage to milk due to the influence of microbiological factors is the main cause of milk damage. This is because milk is very easily contaminated by microbes, both during the milking process and processing, so that the shelf life of milk is relatively short, which is only about 5 (five) hours when stored at room temperature [1,2]. The weakness of milk in terms of its relatively short shelf life requires a touch of modern technology in the form of pasteurization. Pasteurization effectively kills potentially pathogenic bacteria in milk. This pasteurization process is not able to kill the spores, especially the bacterial spores which are thermoresistant or resistant to high milk so that other handling processes are required in the form of preservation which aims to extend the shelf life of pasteurized milk [3-5].

The addition of kasumba turate to pasteurized milk can be used as a natural colouring agent and preservative because it contains antibacterial properties (flavonoids) which can make milk more resistant and durable. Kasumba turate is very well known, especially in the bone community as a colouring agent in drinking water and food. Apart from that, dyes are also used as a traditional medicine which is empirically used by the people of South Sulawesi for the treatment of measles. It is also known

as a cosmetic additive and has not been used widely in medicine. In China, the flowers are used for the treatment of diseases such as blockage of the blood vessels in the brain, male sterility, rheumatism and bronchitis, and as a tea tonic to strengthen blood circulation and the liver. Treatment with safflower has also shown beneficial effects on pain and swelling due to trauma [6].

Based on the information that has been obtained, it can be seen that some of the bioactive substances in kasumba turate can function as antibacterial, so it is deemed necessary to research the organoleptic and physical quality of pasteurized milk with the addition of kasumba turate at different storage times. Kasumba turate is very attractive to improve the quality of pasteurized milk and has added value to the resulting product. The results of the analysis of kasumba turate flower extract showed that the main constituents were carthamin, carthamone, neo-chartamin, nona-cosane, saflower yellow dye, safflomin A, dipalmitine, adenoside, beta-sitosterol, and polysaccharides [7]. Based on the description above, it is necessary to do research that can support and provide information about the organoleptic quality of pasteurized milk with the addition of kasumba turate at different storage times.

2. Materials and methods

The materials used in this study were kasumba turate and whole milk. The tools used in this research are tissue, stove, pot, spoon, filter, measuring cup, plastic bottle, scale, thermometer, label paper, pH meter, stopwatch, and refrigerator. The design used was completely randomized. The treatment in this study was the difference in storage time (0 hours, 4 hours, 8 hours, 12 hours and 16 hours) with 20 panellists. Pasteurized milk was made from reconstituted milk that was from full cream milk powder (commercial milk) with a concentration of 10% (w/v). The milk was added with kasumba turate 0.5% and then pasteurized by HTST method (± 72°C for 15 seconds). The parameters measured in this study is the organoleptic (color, aroma, viscosity test). The data were analyzed variously and processed with SPSS 16. The treatment which showed the effect was further directly tested by Duncan's method.

3. Results and discussion

3.1. Color test

Kasumba turate contains two large groups of water-soluble pigments namely yellow carthamidin. This is because kasumba turate contains chemicals that dissolve easily in water when mixing milk with kasumba turate produces a yellow color. The color organoleptic test results on pasteurized milk during different storage with the addition of kasumba turate presented in figure 1.

The results of the analysis of variance showed that the addition of kasumba turate (*Carthamus tinctorius L*) did not affect ($P>0.05$) the percentage of milk color added with kasumba turate. Figure 1 shows that the color of milk with the addition of kasumba turate does not change. The average color chosen by the panellists is indicated by yellow. This is because the addition of Kasumba turate mixed into pasteurized milk contains a chemical, namely bixin, which is usually formulated to display colors in the yellow, orange, orange to red range in various foods and beverages such as butter, margarine, processed cheese, yoghurt and ice cream. Kasumba turate contains more than 150 volatile (volatile) flavour-producing compounds plus various nonvolatile (non-volatile) active compounds, and many of them are carotenoids, including zeaxanthine, lycopene, and various α- and β-carotene. The golden-orange yellow color of kasumba turate comes from α-crocin which is a trans-crocetin di- (β-D-gentiobiosyl) ester (systematic name (IUPAC): 8,8-diapo-8,8-carotenoic acid). Meanwhile, crocin which is the source of the aroma of kasumba turate is the digentiobiose ester of crocetin [8].

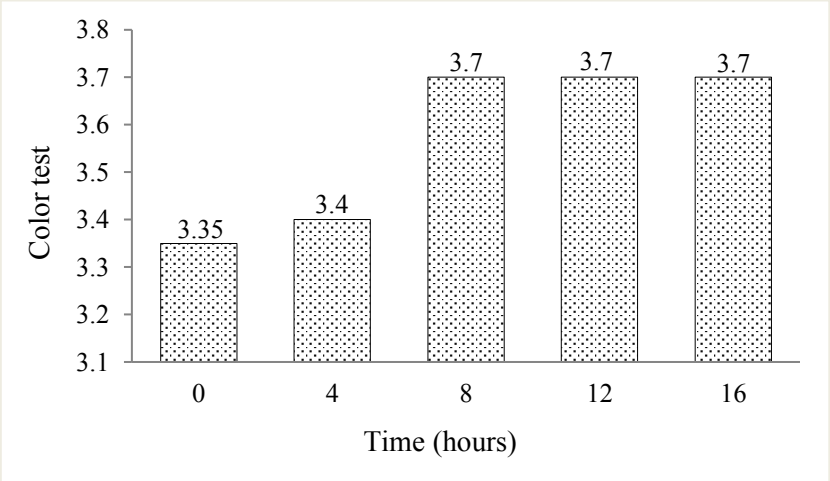

Figure 1. Color test on pasteurized milk added with kasumba turate during storage

3.2. Aroma test

Milk has a distinctive aroma and easily absorbs odors and dissolves easily in fat. The aroma of milk is closely related to the levels of lactose in milk and the smell of milk which is caused by the high content of lactose and low chloride content. Organoleptic test results of milk aroma during storage with the addition of cassava turate can be seen in figure 2.

The organoleptic test results for the aroma of milk during storage with the addition of kasumba turate can be seen in figure 2. The analysis of variance showed that the addition of kasumba turate to pasteurized milk did not affect (P>0.05) on the aroma of milk during storage. Figure 4 shows that during storage there is no decrease in the aroma of milk because the cassava turate added to pasteurized milk can retain the aroma of milk due to the presence of anti-bacteria that inhibits microbial growth against unwanted odors. The aroma of milk changes easily from what you want to smell that is not desired, this is influenced by the nature of milk fat which easily absorbs odors around it. Nurwanto (2009) states that the smell of milk is generally delicious, but it is also very easy to change when exposed to certain objects [9]. Milk is divided into 2 major parts, namely 87.25% water and 12.7% solid substances. The solid substance is divided into 3.08% fat, 3.5% protein, 4.8% lactose, 0.65% minerals. These solid substances give the milk a distinctive aroma.

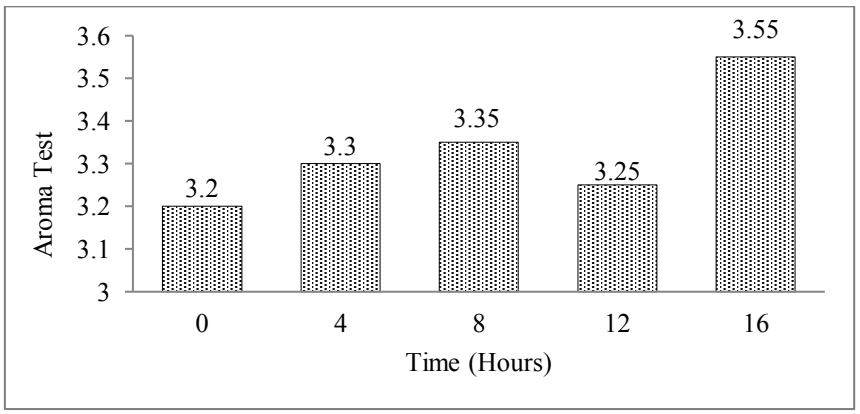

Figure 2. Test the aroma of milk in pasteurized milk added with kasumba turate during storage

The organoleptic test results for the aroma of kasumba turate on pasteurized milk during different storage with the addition of kasumba turate presented in figure 3.

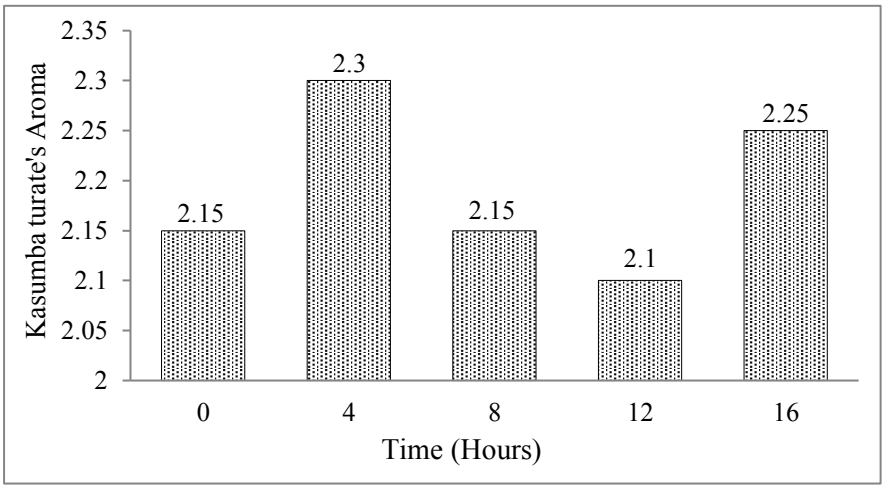

Figure 3. Kasumba turate aroma test on pasteurized milk added with kasumba turate during storage

The analysis of variance showed that the addition of kasumba turate did not affect the aroma of pasteurized milk (P>0.05). During storage from 0 hours to 16 hours of storage, the resulting aroma of kasumba turate was higher than the value of 2.3 in 4 hours among others without the aroma of kasumba turate. The addition of kasumba turate to pasteurized milk during storage did not change the aroma. This happened because each treatment added 0.5% kasumba turate. Kasumba turate is a preservative that can maintain the quality of milk. Kasumba turate contains bixin and norbixin which are useful as natural dyes. Apart from being natural dyes, bixin and norbixin have proven potential as antioxidants, have the potential for antimutagenic and antigenotoxic activities, so they also have potential as anticancer, anti-fungal and anti-inflammatory properties so that they can be utilized for health. Apart from preservatives and dyes, it can also be used as a traditional medicine that is empirically used by the people of South Sulawesi for the treatment of measles. The flowers of kasumba turate have been used as a remedy for stroke, gynaecological disease, coronary heart disease, apparatus wind, and hypertension in Chinese folk medicine [10]. Kasumba turate functions as an antibacterial containing several bioactive substances and also as a preservative to improve the quality of pasteurized milk and have added value in the products produced.

3.3. Viscosity test

The consistency of milk is a physical characteristic of milk that must be considered in determining the quality of milk. The viscosity value of pasteurized milk during storage with the addition of kasumba turate presented in figure 4.

The results of the analysis of variance showed that pasteurized milk with the addition of kasumba turate had a significant (P<0.05) effect on storage. The consistency/viscosity of milk from 0 hours to 12 hours of storage, the resulting viscosity value is 2.6, which is close to the viscous value as well as 16 hours of reaching the viscous value.

Figure 4 shows that during storage the thickness of milk changes. This is because the heating method used is the same, namely HTST for 15 seconds and the concentration interval is not much different so that the longer the heating is done, the milk will increase. This is following the opinion Valik *et al.,*(2013) that the longer the heating is done, the viscosity will increase because the water contained in it will evaporate a lot so that the water content will decrease [11]. With longer heating, the water content in the material tends to evaporate a lot so that the total solids increase.

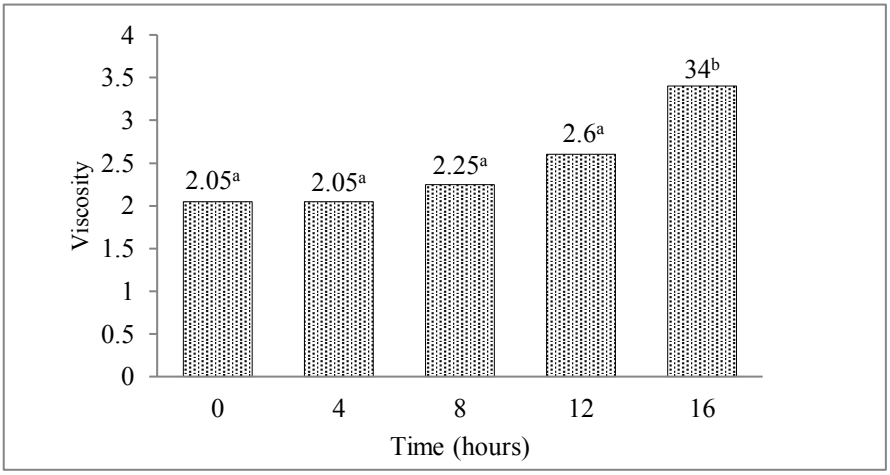

Figure 4. Viscosity test of pasteurized milk added with kasumba turate during storage

The results of the Duncan test in figure 4 show that the highest organoleptic viscosity of pasteurized milk was obtained in treatment P4 with a value of 3.4, namely 16 hours which was significantly different ($P<0.05$) higher than treatment P1, P2, and P3 with successive results, namely 0.05, 0.05, 2.25 and 2.6. This is presumably because the higher the concentration of kasumba turate extract, the higher the organoleptic activity is obtained, and it is suspected that there are factors that affect the organoleptic activity, namely when heating with a temperature of 82^{o}C. This is following the opinion of Pokorny *et al.,* (2001) which states that high oxygen pressure, area of contact with oxygen, heating or irradiation causes an increase in the chain of initiation and propagation of oxidation reactions and decreases or increases the added organoleptic activity of the material [12]. Kasumba turate also has chemical-physical properties that affect the organoleptic test, this is following the opinion of Sunarni (2005) which states that in food ingredients the hydrophobic and hydrophilic properties of antioxidants greatly affect the effectiveness of their antioxidants [13]. The more polar the antioxidant kasumba turate, the more active it will be in pure lipids, while the non-polar antioxidants are more effective in polar substrates such as emulsions. This is supported by the research of Yosina *et al.,*(2015) which states that antioxidant activity is the ability of a compound or extract to inhibit oxidation reactions which can be expressed by the percentage of inhibition or percentage of inhibition which proves that the higher the concentration of the extract used, the greater the antioxidant activity obtained [14].

4. Conclusion

During the storage of the organoleptic quality of the color, the aroma of kasumba turate, the aroma of milk did not change but affected the thickness.

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