The Effect of Additional Carrots Juice to The Making of Yoghurt Assessed from Physical, Chemical and Organoleptical

Dimas Fajar Nugroho and Desna Ayu Wijayanti
Akademi Peternakan Karanganyar. Jl. Lawu No 115 Karanganyar.Telp (0271) 495212
Email : fajarresmi@gmail.com

Abstract

Yoghurt was one form of beverage products from milk processing that utilizes microbes in the fermentation of fresh milk into a semi-solid emulsion product with a more acidic taste. The aim of this research was to know the effect of carrot juice and optimal addition were: color, organoleptic quality (aroma, texture, color and taste), vitamin C, WHC of yoghurt. The materials used were fresh milk, carrot juice, starter plain yoghurt. The method used in this research is experimental method with Randomized Completely Block Design of 5 treatments namely the addition of carrot juice in yoghurt with concentration 0%, 10%, 15%, 20%, and 25% of milk volume (1000 ml), with each treatment was done with 4 blocks. The data analysis used variance analysis, followed by Duncan Multiple Range Test. The results showed that the addition of carrot juice 20% in the manufacture of yoghurt with different concentrations gave a very significant effect difference ($P<0.01$) on the lightness (L*), yellowness (b*), vitamin C and WHC as well as a real effect ($P <0,05$) to the redness color (a*) and not not give significant effect ($P>0,05$) to pH, syneresis and lactic acid bacteria. The result showed that the concentration of adding carrot juice is 20%, which results in the best quality yogurt drink with the following average values of vitamin C; 15.13%, color; 59.95 (L), 19.30 (a *), 25.85 (b *), WHC; 25% and organoleptic; 3.75 (aroma), 3.98 (color), 3.40 (taste) 4.44 (texture), pH; 4.75

Keyword: carrot juice, physical quality, yoghurt

Introduction

Yogurt is a form of beverage product from milk processing that utilizes microbes in the fermentation process of fresh milk into a semi-solid emulsion product with a more sour taste. The lactic acid that is formed causes yogurt to have a sour taste (Wahyu, 2008).

Carrots (Dascus carota L) are vegetables that are generally used to meet human nutrition. Carrots are rich in beta carotene, ascorbic acid, tocopherols and are classified as vitaminized foods (Hashimoto and Nagayama, 2004). Carrot vegetables have an important role for body health, this is due to the nutritional content of carrots, especially carotene, which is a source of provitamin A (Sukarini, 2020).

Carrots are expected to be able to give yogurt a more attractive color, namely orange or reddish color because they contain beta-carotene. The form of presentation in the taste and color of the fruit often raises doubts on the safety side of the product.

Besides that, the mindset of consumers that tends to influence the benefits of the product in a comprehensive manner results in the need for a form of introduction of natural ingredients that can overcome this problem. Based on this, it is necessary to conduct research to see to what extent the effect of adding carrot juice in the process of making yogurt.

Materials and Methods

This research was conducted at the Karanganyar Animal Husbandry Academy Laboratory. The research data collection was conducted in June 2020. The ingredients used are milk, carrots and plain yogurt starter. Iodine, distilled water, 75% alcohol.

Research Methods

The method used was an experiment using a completely randomized design with 4 treatments and 5 groups. The combination of treatments in this study were as follows: the addition of carrot juice as much as P0 (0%), P1 (10%), P2 (15%), P3 (20%) and P4 (25%) from the volume of milk.

Yogurt making procedure

Fresh cow's milk were added with carrot juice according to the treatment, namely 0%, 10%, 15%, 20%, and 25 of the volume of milk (1000 ml), then pasteurized at 60-65^{o}C for 15 minutes. Then the temperature of the milk were lowered until it reaches a temperature of 45^{o} C, each treatment were added with a 5% starter. After stirring, each treatment was closed tightly. Furthermore, incubation was carried out at room temperature for 24 hours (Ace and Supangkat, 2006). After the incubation process was complete, then the yogurt put in 50 ml sterilized plastic cups, then the organoleptic quality properties of the resulting yoghurt are tested.

Observation Variable

The research variables observed were WHC, Vitamin C, color, and organoleptic (color, taste, aroma, texture).

Data analysis

The data obtained were analyzed by using ANOVA (Analysis of Variance). If there is a significant difference in effect between treatments, then proceed with Duncan's Multiple Range Test (Astuti, 2007).

Results and Discussion

WHC

The results of the analysis of variety showed that the concentration level of adding carrot juice had a very significant effect ($P < 0.01$) on the binding capacity of yogurt drink water, the average binding capacity of yogurt drink water was followed by a decrease in the pH value and an increase in acid. Fermented products undergo protein

denaturation due to low pH values. Acidic environmental conditions at isoelectric pH will cause a decrease in the charge of casein ions, so that casein micelles are unstable and aggregated into simple amino acids and settles, causing the value of water binding capacity to decrease (Harjiyanti, Pramono and Mulyani, 2013).

Table 1. Results of WHC, Vitamin C and Color Analysis

Treatment	WHC** (%)	Vitamin C** (mg/100g)	Color		
			L**	A	b**
T0	28.25 ± 3.30^{ab}	3.91 ± 1.74^{a}	67.03 ± 2.29^{c}	16.48±1.82	12.38 ± 2.88^{a}
T1	26.75 ± 6.02^{a}	4.35 ± 1.10^{b}	60.95 ± 1.97^{b}	17.78±0.90	22.73 ± 4.09^{b}
T2	26.00 ± 4.08^{a}	4.4 ± 1.66^{b}	59.95 ± 0.89^{b}	19.30±0.68	25.85 ± 4.42^{b}
T3	25.00 ± 3.56^{c}	5.72±1.81	58.85 ± 0.98^{a}	20.60±0.74	28.48 ± 5.76^{b}
T4	23.25 ± 2.99^{d}	5.67 ± 1.46^{c}	57.53 ± 0.60^{a}	23.15±1.98	31.23 ± 4.72^{c}

* Different notations in the same column indicate significant differences ($p < 0.05$)

Vitamin C

The results of the analysis of variance showed that the treatment of adding carrot juice had a very significant effect ($P < 0.01$) on vitamin C. The results of the average value of the test for vitamin C for yogurt drink showed that the lowest value in treatment was P0, namely 3.91 and the highest contained in the P3 treatment, namely 5.72. The addition of higher carrot juice caused an increase in the content of vitamin C in the yogurt drink, namely without the addition of carrot juice (P0) of 3.91, addition of 10% carrot juice (P1) of 4.35, addition of 15% (P2) of carrot juice of 4 , 4, the addition of 20% carrot juice (P3) was 5.67 and the addition of carrot juice 25% was 5.67. The addition of higher carrot juice resulted in an increase in the tilapia vitamin C content in each treatment. This is presumably due to a combination of yogurt drinks according to Raum (2003).

Color

The results showed that the brightness (L *) of the yogurt drink decreased with the increase in the amount of fruit juice given, while the redness (a *) and yellowish (b *) levels showed an increase.

Brightness Level (L *)

The average brightness color test (L *) of yogurt drink shows that the lowest value in treatment P4 was 57.53 and the highest value is in treatment P0, namely 67.03. The addition of higher carrot juice causes a decrease in the brightness of the yogurt drink, namely without the addition of carrot juice (P0) of 67.03, addition of 10% of carrot juice (P1) of 60.95, addition of 15% of carrot juice (P2) of 59.95, addition of 20% of carrot juice (P3) of 58.85 and the addition of carrot juice 25% by 57.53. The decrease in the average brightness value from the P0 treatment (without adding carrot juice) to the addition of 25% carrot juice (P4) was caused by carrot juice added to the yogurt drink which resulted in a decrease in the pH value during the fermentation process, where at low pH conditions, milk fat which dissolves the carotene pigment that causes yellowish color and lagtoflav pigment.

Redness Level (a *)

The results showed that the reddish color of the yogurt drink which was given the addition of carrot juice with different concentrations showed an increase. The highest value was found in treatment P4, namely 23.15 and the lowest value was obtained in treatment P0, namely 16.48. This increase is due to the presence of riboflavin which gives a greenish yellow milk color, while carotene will give the milk fat a reddish color (Nurwantoro and Mulyani, 2013). The increase in the redness of the yogurt because the fruit juice contains natural carotenoid coloring agents which in high concentrations will form a dark yellow color (Sutedjo and Nisa, 2015). It is dissolved by water, so that the brightness (L *) of the yogurt drink decreases (Saleh, 2004).

Redness level (b *)

The addition of higher carrot juice causes the b * value of the yogurt drink to increase. Visually, you can see a yellowish color on the yogurt drink. Winarno (2007) states that the yellowish color in fermented milk is due to the dissolution of vitamin A, cholesterol, and carotene pigments in the fat glubules. Yogurt drink that was given carrot juice addition treatment had different color characteristics, the higher the carrot juice concentration given, the more orange the color would be. The orange color is caused by the presence of carotene content in the added carrot juice. According to Sumardika (2007), it is dissolved by water, so that the brightness (L *) of the yogurt drink decreases (Saleh, 2000).

Organoleptic

Organoleptic assessment is a way of measuring, testing or assessing the quality of a product by using the sensitivity of the human senses. Organoleptic properties can also be called sensory properties because the assessment is based on sensory stimulation by organs or senses that are owned by humans.

Table 2. Organoleptic Analysis Results

Treatment	Parameter			
	Aroma*	Color**	Taste**	Textur
T0	4.38 ± 0.30^{a}	1.28 ± 0.06^{a}	1.35 ± 0.25^{a}	3.70±0.56
T1	4.01 ± 0.51^{b}	3.28 ± 0.43^{b}	2.19 ± 0.23^{b}	4.34±0.70
T2	3.78 ± 0.34^{b}	3.98 ± 0.29^{c}	2.89 ± 0.37^{c}	4.28±0.42
T3	3.75 ± 0.18^{c}	3.98 ± 0.18^{c}	3.40 ± 0.35^{d}	4.44±0.26
T4	3.59 ± 0.21^{d}	4.44 ± 0.59^{d}	3.39 ± 0.73^{d}	4.29±0.83

Note: * Different notations in the same column show significant differences ($p < 0.05$)
** Different notations in the same column show very significant differences ($p<0.01$).

Aroma

The organoleptic aroma of yogurt drink which was added with carrot juice with different concentrations showed that all the panelists accepted it. The criteria for assessing carrot aroma are very dominant (1), dominant carrot aroma (2), slight carrot aroma (3), slight yogurt aroma (4), balanced yogurt and carrot aroma (5) and dominant

yogurt aroma (6). Panelists gave ratings ranging from the aroma of balanced yogurt and carrots (4.38) to the slight aroma of carrot drink (3.25). Aroma can be used as an indicator of product damage, for example as a result of heating or poor storage or a defect in a product. Handling and storage of a food product can determine the odor of the product. The aroma, shape and taste of yogurt drinks can be influenced by the type of bacterial culture, the type of milk, the amount of milk fat, the total solids of milk without fat, the fermentation process and the milk used (Routray and Mishra, 2011).

Color

Based on the results of the organoleptic test, the color of the yogurt drink which was given the addition of different carrot juice was in the white range, namely 1.28 to orange, namely 4.44. This shows that the addition of carrot juice greatly affects the color of the resulting yogurt drink. The results of the analysis of variance showed that the addition of carrot juice with different concentrations in this study gave a very significant difference ($P < 0.01$) on the color assessment of yogurt drink. The color of the yogurt drink with the addition of carrot juice has a different color appearance between the yogurt with the addition of carrot juice and the control yogurt. The control yogurt is creamy white, the addition of carrot juice to the yogurt gives a soft orange color and gives it a light orange color. This is because carrots themselves contain β-carotene which is a bright orange pigment, so the addition of carrot juice affects the color of yogurt (Salwa et.al. 2004)

Taste

The analysis results showed that there was a very significant effect ($P < 0.01$) on the yogurt drink with the addition of carrot juice with different concentrations. Panelists' assessment of the taste of yogurt drinks ranged from slightly acidic (1.35) to more acidic (3.39). These results are in accordance with the research of Jannah et al (2014) that the taste of yogurt drink with the addition of star fruit is 3.68-3.24, based on the results of the taste of yogurt drink with the addition of star fruit extract tends to be somewhat preferred (criteria of dislike to like) with a different flavor. tend to be acidic (criteria between slightly acidic to acidic).

Texture

The level of viscosity will affect the texture and appearance of the resulting yogurt drink and affect the level of consumer acceptance of the product being made. The scoring criteria are based on the score, namely very very thick (1), thick (2), slightly thick (3), slightly thin (4), and very watery (5). According to Zubaidah et.el., (2005), the addition of carrot juice makes the yogurt texture thinner. The control yogurt has a texture that is too thick, while the yogurt with the addition of carrot juice with a sufficient concentration has a texture that is too runny. Yogurt with the added concentration of medium carrot juice is yogurt that has a texture with the like category, because of the right texture, not too thick or too runny.

Conclusion

The best concentration of adding carrot juice is 20%, which results in the best quality yogurt drink with the following average values of vitamin C; 15.13%, color; 59.95 (L), 19.30 (a *), 25.85 (b *), WHC; 25% and organoleptic; 3.75 (aroma), 3.98 (color), 3.40 (taste) 4.44 (texture), pH; 4.75

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