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Research paper

Influence of Use Lactobacillus fermentum L23 and Streptococcus thermophilus with Dragon Fruit Extract (Hylocereus Polyrhisuz) to Quality of Microbiology, Chemistry and Organoleptic Value of Yoghurt

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Abstract

The difference between starter concentration and dragon fruit (Hylocereus polyrhizus) extract concentration on the quality of microbiology, Chemistry, and organoleptic value of yoghurt. The method of research was the experimental method by using a Randomized Block Design (RBD) 3x4 factorial pattern with 2 replicates as a group. Factor A starter concentration that is A1: 4%, A2: 5%, A3: 6% and Factor is dragon fruit extract that is B1: 0%, B2: 1%, B3: 2%, B4: 3% . The parameters measured were Total Lactic Acid Bacteria colonies, Water content, protein content, fat content, antioxidant activity, pH Value and organoleptic value of yoghurt. The results show that there was a real interaction ($P < 0.05$) concentration of the starter (factor A) and concentration of the extract dragon fruit (factor B) against total lactic acid bacteria colonies. but there was no significant interaction ($P > 0.05$) on water content, protein content, fat content, antioxidant activity, pH value and organoleptic value of yoghurt. factor A can give a real effect ($P < 0.05$) to antioxidant activity and pH value of yoghurt. While factor B can give a very real effect ($P < 0.01$) on water content, protein content, fat content, antioxidant activity and pH value of yoghurt. Then for organoleptic value there is no significant effect ($P > 0.05$) from each factor to organoleptic value of yoghurt. The best percentage addition for yoghurt was 5% at starter concentration and 2% at dragon fruit (Hylocereus polyrhizus) extract concentration with total lactic acid bacteria colonies 170×10^8 CFU/ml, water content 81.22%, protein content 4.65%, fat content 3.58%, antioxidant activity 44.53%, pH value 4.4 and organoleptic value still in range preferred by panelists.

Keywords: *chemical quality, dragon fruit extract, microbiology, starter, yoghurt.*

1. Introduction

One food product that comes from livestock and is favored by some people, namely milk. Milk is a food ingredient that has high nutritional value, so that it becomes a medium that is highly favored by microorganisms for its growth and development [1]. With the growth of various microbes can change the quality of milk which is characterized by changes in taste, aroma, color and appearance that causes milk to be damaged. Therefore, to improve the quality of milk so as not to become damaged quickly, various techniques can be carried out both processing and preserving, one type of preservation in milk is generally known as fermentation. Products from fermented milk which are commonly known include yoghurt [2].

Yoghurt is a product obtained from pasteurized milk, then fermented with certain bacteria until acidity, odor and taste are typical, with or without the addition of other ingredients [3]. Yoghurt is milk that is fermented by using microbial mixed cultures, generally Lactobacillus bulgaricus and Streptococcus thermophilus, so as to produce consistency resembling pudding. In addition to the use of Lactobacillus bulgaricus bacteria can also be used other bacteria such as Lactobacillus bacteria isolated from buffalo milk [4].

Through isolation and identification of buffalo milk in Agam Regency, West Sumatra, 88 strains of LAB were produced, most of which were characterized as rod, gram positive, catalase-negative, homofermentative and heterofermentative. One of the isolates included Lactobacillus fermentum L23 (A 3.3) type of LAB which showed high inhibition against Listeria monocytogenes [5]. Then according to [6] which states that Lactobacillus fermentum strain L23 can produce bacteriocin and is stable at hot temperatures with molecular mass.

Lactobacillus bulgaricus substitution in yoghurt with Lactobacillus fermentum L23 bacteria is expected to change the texture of yoghurt to be more dense and can produce bacteriocin so that it can inhibit the growth of pathogenic bacteria in food. While the addition of Streptococcus thermophilus to milk can produce lactic acid which can also preserve milk. During fermentation, this bacterium produces acetaldehyde which forms the aroma in yoghurt [7].
Yoghurt is very beneficial for people who are not resistant to milk sugar (lactose), which is known as a sufferer of "lactose intolerance". Therefore yoghurt can be linked to the need for functional food for the general public. According to the Regulation of the Head of the Food and Drug Supervisory Agency [8], it is stated that functional food is processed food containing one or more functional components based on scientific studies having certain physiological functions, proven to be harmless and beneficial to health. Thus to improve the quality of yoghurt as a functional food, yoghurt can be combined with other components of fruits, such as by adding dragon fruit extract. This is because dragon fruit contains important components that can increase the antioxidant content of yoghurt.
Dragon fruit (Hylocereuspolyrhizus) is a horticultural plant that was developed in Indonesia. Dragon fruit contains bioactive substances which are beneficial for the body including antioxidants (ascorbic acid, beta carotene and anthocyanin) and contain dietary fiber in the form of pectin. With its sweet and refreshing taste, dragon fruit is also rich in benefits such as lowering cholesterol and balancing blood sugar, binding cancer-causing carcinogens and improving digestion. Then than that dragon fruit also contains oligosaccharides, including raffinose, stakiose and fructo-oligosaccharides [9]. According to previous research [10], the use of dragon fruit extracts on yoghurt ranged from 7% could reduce pH and increase the acidity of yoghurt and increase the inhibitory power of E. coli along with the addition of dragon fruit concentration.

2. Method of Research

2.1. Preparation of Extract Dragon Fruit

Extract dragon fruit were made according to [11] dragon fruit peel was peeled, the flesh was chopped and then oven using 60°C until it dries. After drying the blender until it's shaped like flour. Weigh 50 grams of dragon fruit flour, put it into erlemenyer and add 70% polar ethanol solvent as much as 500 ml. The maceration results are filtered using filter paper, separated between powder and solution. The filtrate obtained was evaporated vacuum using a rotary evaporator to remove the solvent.

2.2. Preparation Yoghurt Starter

In this study preparation yoghurt starter based on method of [12].

2.3. Yoghurt Making

In this study, yoghurt making based on method of [12].

2.4. Data Analysis

This experiment used experimental method designed with Randomized Block Design (RBD) factorial pattern 3 x 4 and 2repetition. The treatment is a starter addition factor, consisting of (A1) addition of 4% stater. (A2) 5% starter addition.(A3) addition of 6% starter.Factor B is the addition of extract red dragon fruit, consisting of (B1) addition of 0%, (B2) addition of 1%, (B3) addition of 2%, (B4) addition of 3%. The treatments that showed the results were significantly different (F count> F table 0.05). Then further tests were performed using Duncan's Multiple Range Test (DMRT). In this study, the measured variables are the Total Lactic Acid Bacteria colonies, Water content, protein content, fat content, antioxidant activity, pH Value and organoleptic value of yoghurt.

3. Result of Research

3.1. Total Lactic Acid Bacteria Colonies

The results of statistical analysis showed that there were interactions (P <0.05) between difference in the addition of starter concentration (factor A) and fruit extract concentration dragon (factor B) to total yoghurt lactic acid bacteria. This shows that an increase in the amount of starter and extract of dragon fruit affects the total BAL. Average Total Lactic Acid Bacteria in each treatment presented in Table 1.

Table 1: Average total lactic acid bacteria (× 10^8 CFU/ml) difference in addition starter concentration (Factor A) and concentration of dragon fruit extract (Factor) in various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	126^{cd}	154^{bc}	179^{ab}	112^{de}	142
A2	101^{def}	203^{a}	170^{ab}	83^{ef}	139
A3	73^{f}	100^{def}	147^{bc}	91^{ef}	91
Average	100	152	165	95	

In Table 1, show the interaction is significantly different (P <0.05) Starter (Factor A) with dragon fruit extract (factor B) on total lactic acid bacteria. The results of the variance analysis show the interaction between factor A and factor B on the total effect of lactic acid bacteria was significantly different (P <0.05). Duncan’s multiple range test results showed that the interaction of the treatment of total lactic acid bacteria on A2B2 203 × 108 CFU / ml treatment was significantly different (P <0.05) against treatment A1B3 179 × 108 CFU / ml, A2B3 170 × 108 CFU / ml, A1B2 154 × 108 CFU / ml, A3B3 147 × 108 CFU / ml, A1B1 126 × 108 CFU / ml, A1B4 112 × 108 CFU / ml, A3B4 91 × 108 CFU / ml, A2B4 × 108 CFU / ml, A3B1 73 × 108 CFU / ml. Different real (P <0.05) total lactic acid bacteria caused by starter concentration and addition of dragon fruit extract. Starter interaction (Factor A) and fruit extract naga (factor B) shows the total increase in lactic acid bacteria substitution of starter (factor A) and dragon fruit extract (Factor B) on yoghurt.

The table above shows the total average of lactic acid bacteria by giving 4%, 5% and 6% starter and giving 0%, 1%, 2% 3% extract Dragon fruit ranges from 73 × 108 CFU / gr - 203 × 108 CFU / ml. Total low BAL in A3B1 treatment, namely yoghurt with 3% starter addition (A3) and without the addition of dragon fruit extract due to the absence of extract dragon fruit that functions as a prebiotic that will spur growth probiotic bacteria Lactobacillus fermentum L23 and Streptococcus thermopillus. The higher the addition of starter causes the nutrients for BAL not sufficient for BAL growth in yoghurt [13].

Addition of dragon fruit extract red can increase the growth rate of BAL because of dragon fruit extract reds have simple sugar compounds such as oligosaccharides which are prebiotics, a group of oligosaccharides found in dragon fruit extract, namely raffinosa. This is in accordance with the opinion of [14] stating that BAL need carbohydrates to be fermented, these bacteria will not be able to live on a medium that contains very little carbohydrate. [15] added that red dragon fruit (Hylocereus polyrhizus) contains carbohydrates and other compounds, and is rich in antioxidants. Carbohydrate on red dragon fruit can be used by BAL as a source of energy during fermentation. The total height of BAL in A2B2 treatment was 203 × 108 CFU / ml due to the addition of 4% starter has been maximally utilized dragon fruit extract as a prebiotic to increase the total BAL. Treatment A2B2 differs not significantly (P> 0.05) with A1B3 so it can be known addition of 1% dragon fruit extract has increased the total LAB. Yoghurt with the addition of 4% starter concentration (A2) and red dragon fruit extract at a concentration of 1% (B2) is the best medium for growth the microorganisms used, the condition is seen increasingly the total number of lactic acid bacteria. In treatment A2B4 83 × 108 CFU / ml and A3B4 91 × 108 CFU / ml decreased due to poor environmental conditions acid. The pH of yoghurt from the results of the study decreased 4.3 - 4.2, so the buildup H + ions in cells will cause electrolyte imbalances in cells bacteria so that bacteria will try to remove H + which results bacteria release large amounts of ATP and cause cell death [16].

[17] stated that besides produce lactic acid, lactic acid bacteria also produce other metabolites such as hydrogen peroxide and other antibiotic compounds which, besides being able to inhibits the growth of pathogenic bacteria, in large accumulations it is possible to inhibit lactic acid bacteria too. Antibacterial activity from dragon fruit extract causes the work of lactic acid bacteria in the description Lactose is inhibited, so the growth of BAL is less stable. But this is the case not too influential, the amount of lactic acid bacteria found in yoghurt it is in accordance with the requirements of probiotic drinks. Requirements for probiotic drinks contain more than 108 cells of probiotic bacteria per milliliter of life [18] and according to World Health Organozation [19] is 109CFU / ml. Every treatment produces the total BAL that meets the minimum standard is 107 CFU / ml [20]. The average amount of lactic acid bacteria found in yoghurt is 73 × 108 CFU / ml - 203 × 108 CFU / ml. This shows that raw materials and the substrate used can produce yoghurt with good quality [21].

3.2. Water content

The results of statistical analysis show that there is no interaction (P> 0.05) between Factor A (Starter) and Factor B (Dragon fruit extract) on water content. The average value of water content in each treatment is presented in Table 2.

Table 2: Average yoghurt water content (%) difference in the addition of starter concentration (factor A) and concentration of dragon fruit extract (factor B) on various treatment.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	83.92	82.65	81.59	80.85	82.25
A2	83.83	82.03	81.22	81.80	82.04
A3	83.98	82.60	81.62	81.71	82.48
Average	83.91^a	82.43^b	81.48^c	81.22^d	

In Table 2, shows that yoghurt with differences the addition of starter concentration (Factor A) has an unreal effect (P> 0.05) and have a significant effect (P <0.05) on addition concentration of dragon fruit extract on yoghurt water content. Addition starter concentration (Factor A) has no significant effect (P> 0.05) on Yoghurt water content, this is due to Lactobacillus fermentum L23 and Streptococcus thermophilus is a fermented type of lactic acid bacteria homofermentative wherein the results of metabolism do not produce water. So that the activity of lactic acid bacteria has no real effect on water content. As seen in the results of the addition of concentration research starter 4% (A1) with an average of 82.25%, 5% (A2) with an average of 82.04% and starter 6% (A3) with an average of 82.48%.

In yoghurt with the addition of dragon fruit extract (Factor B) in the Table 4, shows that there is an influence on water content ranging from 81.22% - 83.91%. The results of variance analysis showed that yoghurt was added Dragon fruit extract (Factor B) had a very significant effect (P <0.05) on yoghurt water content, which is the highest in treatment without addition Dragon fruit extract 0% (B1) with an average moisture content of 83.91% and the lowest on addition treatment of dragon fruit extract 3% (B4) with an average water content 81.22%. According to the opinion of [22] who states that pectin is an anion polysaccharide complex that is present on the primary and intercellular cell walls in high-level plants. Pectin widely used as a functional component in the food industry because of its ability to form a gel. So that it increases the addition of dragon fruit decreases in water content. The results in this study the yoghurt water content obtained ranged 81.10 - 83.61%, not much different from the results of research [23], namely ranges from 81.26 - 85.56% with the addition of cinnamon bark extract. [24] states that commercial yoghurt uses addition of emulsifiers, flavors, and preservatives, so that the water content lower commercial yoghurt is produced. According to [25] the composition of commercial yoghurt has a moisture content of 75-80%. This is because commercial yoghurt uses a lot of additional ingredients make commercial yoghurt water content lower.

3.3. Protein Content

The results of statistical analysis showed that there was no interaction (P> 0.05) between the difference in the addition of starter concentration (factor A) and the concentration of dragon fruit extract (factor B) on the protein content of yoghurt. The absence of interaction between the addition of starter concentration (factor A) and the concentration of dragon fruit extract (factor B) was due to the pH produced from the starter and dragon fruit extract still at the isolate point which ranged from 4.6. So that shows no interaction on the protein content of yoghurt. The average level of yoghurt protein in each treatment is presented in Table 3.

Table 3: Average yoghurt protein content (%) difference in addition of starter concentration (factor A) and concentration of dragon fruit extract (factor B) in various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	2.75	3.74	3.96	3.99	3.61
A2	2.75	3.80	4.65	4,37	3.89
A3	2.47	3.58	4.38	4.41	3.71
Average	2.66^{c}	3.71^{b}	4.33^{a}	4.25^{a}	

In Table 3, shows that the average protein content in the treatment of starter concentration (factor A) ranged between 3.61% - 3.89%. The treatment of the addition of starter concentration (factor A) did not give a significant effect (P> 0.05) on the protein content of yoghurt. In contrast, it was not significant that yoghurt protein content due to the addition of starter concentration was caused by the pH value of yoghurt with the addition of a starter concentration (Factor A) of 4-6% resulting in a pH value of 4.4-4.7 yoghurt. Regarding the pH of yoghurt, it is still in the range of milk protein isolation points, from 4.3 to 4.6 [26]. This condition results in no effect on the protein content of yoghurt. In accordance with the opinion the pH of the isolate of protein molecules will form the same number of positive and negative ions. So that the protein condition is relatively stable, which results in no effect on yoghurt protein.

3.4. Fat Content

The results of statistical analysis showed that there was no interaction (P> 0.05) between the difference in the addition of starter concentration (factor A) and the concentration of dragon fruit extract (factor B) on the fat content of yoghurt. The absence of interaction between the addition of starter concentration (factor A) and the concentration of dragon fruit extract (factor B) was due to the absence of fat content in dragon fruit extract. So that shows no interaction on the fat content of yoghurt. The average fat content of yoghurt in each treatment is presented in Table 4.

Table 4: Average yoghurt fat content (%) difference in addition of starter concentration (factor A) and concentration of dragon fruit extract (factor B) in various treatments.

Faktor A	Faktor B				Average
	B1	B2	B3	B4	
A1	4.08	3.73	3.53	3.42	3.69
A2	4.12	3.84	3.58	3.34	3.72
A3	4.18	3.69	3.29	3.34	3.63
Average	4.13^{a}	3.75^{b}	3.47^{c}	3.37^{c}	

In Table 4, shows that yoghurt with different starter concentrations (Factor A) did not give a significant effect (P> 0.05) on fat content in yoghurt products. The average fat content of yoghurt with different starter concentrations (Factor A) ranged between 3.63%-3.72%. Different was not significant (P> 0.05) yoghurt fat content due to the addition of starter concentration was caused by an increase in starter delivery up to 6% (A3) did not cause changes to the fat content of yoghurt. So there is only a minimal starter role in breaking milk fat into free fatty acids. In accordance with the opinion of [27] which states that during the fermentation process, the bacteria will experience three main reactions by decomposing the milk component, which is decomposing lactose into lactic acid (fermentation), hydrolyzing casein into peptides and free amino acids (proteolysis) and break down milk fat into free fatty acids (lipolysis).

3.5. Antioxidant Activity

The results of statistical analysis showed that there was no interaction (P> 0.05) between the difference in the addition of starter concentration (factor A) and the concentration of dragon fruit extract (factor B) on the antioxidant activity of yoghurt. The absence of interaction between the addition of starter concentration (factor A) and the concentration of dragon fruit extract (factor B) was due to both factors having their respective antioxidant activity. So that shows no interaction on the antioxidant activity of yoghurt. The average antioxidant activity of yoghurt in each treatment is presented in Table 5.

Table 5: Average activity of yoghurt antioxidant (%) difference in addition of starter concentration (factor A) and concentration of dragon fruit extract (factor B) on various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	19.33	30.84	43.64	56.12	37.48^{b}
A2	19.70	32.26	44.53	57.92	38.60^{ab}
A3	19.92	31.82	45.15	58.73	38.91^{a}
Average	19.65^{a}	31.64^{b}	44.44^{c}	57.59^{d}	

In Table 5, shows that yoghurt with a difference in the addition of starter concentration (Factor A) had a significant effect (P <0.05) on antioxidant activity in yoghurt. The average antioxidant activity of yoghurt with the difference in the addition of starter concentration (Factor A) ranged between 37.48% -38.91%. Where is the highest activity in the treatment of starter starter 6% (A3) with antioxidant activity of yoghurtaveraging 38.91% and the lowest antioxidant activity in the treatment of giving starter 4% (A1) with antioxidant activity of yoghurtan average of 37.48%.

This increase in antioxidant activity is also associated with a total increase in lactic acid bacteria, Lactobacillus. So that the higher the starter concentration, the higher the ability of LAB to break lactose into lactic acid and the more H + ions donated to free radicals can increase primary antioxidant activity. As shown in Table 5, the addition of starter as much as 6% can produce antioxidant activity of 38.91%. This is in accordance with the opinion of [28] which states that the ability to change sugar to lactic acid by lactic acid bacteria is synergistic by giving H + ions to free radicals thus increasing the primary antioxidant activity. In addition, the ability of lactic acid bacteria to break down proteins (proteolytics) into small peptides (bioactive peptides) which have antioxidant activity is also associated with increased antioxidant activity in yoghurt [29].

3.6. pH value

The results of statistical analysis show that there is no interaction (P> 0.05) between starter (Factor A) and dragon fruit extract (Factor B) on pH value. However, each factor showed a significant effect (P <0.05). The average pH value for each treatment is presented in Table 6.

Table 6: Level of pH Value difference in addition of starter concentration (Factor A) and concentration of dragon fruit extract (Factor B) on various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	4.8	4.6	4.7	4.6	4.7[a]
A2	4.7	4.5	4.4	4.3	4.5[b]
A3	4.6	4.4	4.3	4.2	4.4[b]
Average	4.7[a]	4.5[b]	4.5[b]	4.3[c]	

In Table 6, showed that yoghurt with a difference in the addition of starter concentration (Factor A) had a significant effect (P <0.05) on the pH value of yoghurt. Average pH value of yoghurt with the difference in the addition of starter concentration (Factor A) ranges from 4.4 - 4.7. Where is the highest activity in the treatment of giving starter 4% (A1) with a yoghurt pH value averaging 4.7 and the lowest pH value on treatment of giving starter 6% (A3) with a pH value of yoghurt on average 4.4.
As shown in the results of the study, on the addition of a starter highest 6% (Factor A) produces the lowest pH of 4.4. Acids the organic formed is dissociated acids in the form H + ions. The more acid produced, the more too H + ions are formed so that the pH measurement by the pH meter electrode shows a decreasing value. The more number of BAL more and more metabolites in the form of lactic acid can dissociate in H + ions so that the pH becomes lower, as evidenced by the greater the proportion of red dragon fruit extract increases the total acid of yoghurt.

3.7. Organoleptic Value

1. Taste
The results of the statistical analysis showed that there was no significant interaction (P> 0.05) between the differences in the introduction of starter concentration (Factor A) and the addition of dragon fruit extract (factor B) to the assessment of the taste of yoghurt flavor. The average score of organoleptic taste in each treatment is presented in Table 7.

Table 7: Average taste of organoleptic test on yoghurt (%) difference in giving starter concentration (factor A) and concentration of dragon fruit extract (factor B) on various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	1.84	2.04	1.64	1.76	1.82
A2	2.04	2.08	1.96	2.08	2.04
A3	1.96	1.92	1.84	1.68	1.85
Average	1.95	2.01	1.81	1.84	

Based on the results of Friedman diversity analysis showed that the treatment of adding starter concentration differences (Factor A) and addition of dragon fruit extract (Factor B) did not give a significant effect (P> 0.05) on the flavor of organoleptic yoghurt with an average organoleptic value ranging between 1.64 - 2.08. The absence of a significant effect (P> 0.05) on the treatment of adding starter concentration differences (Factor A) to the organoleptic value of yoghurt flavor, due to the addition of starter concentrations of 4% to 6% did not give a different effect on the taste of yoghurt produced on this research. As seen in the results of the study, the addition of starters 4% to 6% shows a score of 1.82 - 2.04 which is still within the panelists' preferred range.
2. Aroma
The results of statistical analysis showed that there was no significant interaction (P> 0.05) between the differences in the introduction of starter concentration (Factor A) and the addition of dragon fruit extract (factor B) to the assessment of organoleptic aroma of nyoghurt. The average score for organoleptic aroma in each treatment is presented in Table 8.

Table 8: Average of organoleptic aroma test on yoghurt (%) giving additional starter concentration (factor A) and concentration of dragon fruit extract (factor B) on various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	1.80	2.04	1.88	1.96	1.92
A2	1.92	1.96	2.00	2.20	2.02
A3	1.76	2.04	2.04	1.88	1.93
Average	1.83	2.01	1.97	2.01	

Ased on the results of Friedman diversity analysis showed that the treatment of adding starter concentration differences (Factor A) and addition of dragon fruit extract (Factor B) did not give a significant effect (P> 0.05) on organoleptic aroma of yoghurt with an average organoleptic value ranging from 1.76 - 2,20. The absence of a significant effect (P> 0.05) on the treatment of adding starter concentration differences (Factor A) to the organoleptic value of the aroma of yoghurt, due to the addition of starter concentrations of 4% to 6% did not give a different effect on the aroma of yoghurt produced on this research. As seen in the results of the study, the addition of a starter of 4% to 6% shows a score of 1.92 - 2.02 which is still in the range of panelists' preference.
3. Textsture

The results of statistical analysis showed that there was no significant interaction (P> 0.05) between the difference in the introduction of starter concentration (Factor A) and the addition of dragon fruit extract (factor B) to the organoleptic texture of yoghurt. The average organoleptic texture for each treatment is presented in Table 9.

Table 9: Average of organoleptic texture test on yoghurt (%) difference in giving starter concentration (factor A) and concentration of dragon fruit extract (factor B) on various treatments.

Factor A	Factor B				Average
	B1	B2	B3	B4	
A1	1.56	1.88	1.88	1.84	1.79
A2	1.72	2.04	1.96	1.96	1.92
A3	1.72	1.92	2.04	1.96	1.91
Average	1.67	1.95	1.96	1.92	

Based on the results of Friedman diversity analysis showed that the treatment of adding starter concentration differences (Factor A) and addition of dragon fruit extract (Factor B) did not give a significant effect (P> 0.05) on organoleptic yoghurt texture with an average organoleptic value ranging from 1.56 - 2.04. The absence of a significant effect (P> 0.05) on the treatment of adding starter concentration differences (Factor A) to the organoleptic value of yoghurt texture, due to the addition of starter concentrations of 4% to 6% did not give a different effect on the texture of yoghurt produced on this research. As seen in the results of the study, that the addition of a starter of 4% to 6% shows a score of 1.79 - 1.92 which is still within the panelists' preferred range. The absence of the effect of starter concentration is also influenced by the type and number of microorganisms in the starter [30]. According to [31] the type and number of microorganisms in the starter that are used greatly play a role in the formation and taste and texture of yoghurt, besides that the duration of fermentation and ambient temperature also influence yoghurt making.

Organoleptic value of yoghurt texture in this study shows the level of similarity of the results of [32] research on the texture of sesame-beet milk yoghurt which showed that the most viscous yoghurt texture value of 2.06 was produced in the percentage of 14% sesame seeds with fruit extract concentration bit 15%, while the texture value of yoghurt is the lowest or dilute of 1.40 resulting in the percentage of 10% sesame seeds with a concentration of 5% fruit extract. The results showed that the organoleptic value of the yoghurt treatment was respectively 1.56-2.04 in the range of likes, meaning that the treatment of the research on the organoleptic value of the texture was still favored by the panelists.

4. Conclusion

The results of this study concluded that there was a real interaction at concentration of the starter (factor A) and concentration of the extract dragon fruit (factor B) against total lactic acid bacteria colonies. but there was no significant interaction on water content, protein content, fat content, antioxidant activity, pH value and organoleptic value of yoghurt. factor A can give a real effect to antioxidant activity and pH value of yoghurt. While factor B can give a very real effect on water content, protein content, fat content, antioxidant activity and pH value of yoghurt. Then for organoleptic value there is no significant effect from each factor to organoleptic value of yoghurt. The best percentage addition for yoghurt was 5% at starter concentration and 2% at dragon fruit (Hylocereus polyrhizus) extract concentration with total lactic acid bacteria colonies 170 × 108 CFU / ml, water content 81.22%, protein content 4.65%, fat content 3.58 %, antioxidant activity 44.53%, pH value 4.4 and organoleptic value still in range preferred by panelists.

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