p-ISSN 1410-5659 e-ISSN 2621-5144
Published by:
Unpad Press

Jurnal Ilmu Ternak Universitas Padjadjaran, July 2025, 25(2):152-161
DOI: 10.24198/jit.v25i2.63453
Available online at http://jurnal.unpad.ac.id/jurnalilmuternak

THE IMPACT OF ALOE VERA POWDER ON THE CHARACTERISTICS OF REDUCED-FAT MAYONNAISE DURING STORAGE PERIOD

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Abstract
Steps considered in the creation of healthy functional foods include reducing the fat content in reduced-fat mayonnaise (RFM). During storage, RFM is susceptible to emulsion instability, lipid oxidation, and general quality decline. Natural additives are needed to improve the quality of mayonnaise, one of which is aloe vera powder (AVP). This study aims to determine the effect of AVP use on days 0, 5, 10, and 15, on the physicochemical and organoleptic properties of RFM during storage. This study used the addition of aloe vera powder to reduced fat mayonnaise production. The study was conducted with four treatments and six replications, using a completely randomized design (CRD) through a laboratory experimental approach. The FTIR technique was used to examine AVP to identify functional groups that affect the quality of RFM. The physicochemical and organoleptic qualities of RFM were much better by adding 6% AVP to RFM for 0, 5, 10, and 15 days (P <0.01). In terms of physicochemical and organoleptic quality, storage of mayonnaise with AVP in RFM for up to 15 days still shows good properties.
Keywords: Emulsion, reduced fat mayonnaise, aloe vera powder, storage period

PENGARUH TEPUNG LIDAH BUAYA TERHADAP KARAKTERISTIK MAYONNAISE RENDAH LEMAK SELAMA MASA PENYIMPANAN

Abstrak
Langkah yang dipertimbangkan untuk penciptaan makanan fungsional yang sehat adalah penurunan kandungan lemak pada mayonnaise rendah lemak (RFM). Selama penyimpanan RFM rentan terhadap ketidakstabilan emulsi, oksidasi lipid, dan penurunan kualitas secara umum. Bahan tambahan alami dibutuhkan untuk memperbaiki kualitas mayonnaise salah satunya yaitu Aloe vera powder (AVP). Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan AVP pada hari ke-0, 5, 10, dan 15, terhadap sifat fisikokimia dan organoleptik RFM selama penyimpanan. Penelitian ini menggunakan penambahan tepung aloe vera ke dalam mayonnaise rendah lemak. Penelitian dilakukan dengan empat perlakuan dan enam ulangan, menggunakan rancangan acak lengkap (RAL) melalui pendekatan eksperimental laboratorium. Teknik FTIR digunakan untuk memeriksa AVP guna mengidentifikasi gugus fungsi yang memengaruhi kualitas RFM. Kualitas fisikokimia dan organoleptik RFM jauh lebih baik dengan menambahkan 6% AVP ke RFM selama 0, 5, 10, dan 15 hari (P<0,01). Dilihat dari segi mutu fisikokimia dan organoleptik, penyimpanan mayones dengan AVP dalam RFM hingga 15 hari masih menunjukkan sifat yang baik.
Kata kunci: Emulsi, mayonnaise rendah lemak, tepung lidah buaya, masa penyimpanan

INTRODUCTION

Mayonnaise usually consists of vegetable oil, egg yolk, vinegar, and additional seasonings including salt, sugar, pepper, and mustard (Gao et al., 2025). Mayonnaise is an oil-in-water emulsion product. Their oil content determines the several varieties of mayonnaise: full-fat, reduced-fat, low-fat, and salad dressing. Traditional mayonnaise, which is high in fat, will have an impact on consumer health if consumed in large quantities (Evanuarini and Susilo, 2024). Mayonnaise, being an oil-based emulsion, is prone to physicochemical degradation during storage, mostly from emulsion instability and lipid oxidation. Research by Khalid et al. (2021) highlights how factors such as fatty acid composition and oxidation processes affect the quality of mayonnaise, thereby influencing its viscosity, stability, and color.

To address these issues, research has looked into creating RFM that contains 40–60% fat (Fakhira et al., 2024). RFM satisfies consumer demand for superior options without compromising stability, texture, or visual appeal. Research has examined the use of fat substitutes with carbohydrate bases, such as polysaccharides, plant-based proteins, and natural antioxidants, to enhance the quality of RFM. For example, mangosteen peel extract, tragacanth gum, and basil seed gum have been shown to make RFM thicker and improve its physical and chemical qualities (Ma et al., 2025).

The bioactive compounds found in aloe vera (*Aloe barbadensis Miller*) have drawn attention because it has antimicrobial, antioxidant, and shelf-life-extending properties. Aloe vera contains various essential nutrients such as vitamins A, B, C, E, minerals (calcium, magnesium, phosphorus, iron, sodium, zinc, folate), enzymes, and essential amino acids. AVP also contains 0.26 g flavonoids, 7.82 g polyphenols, and 25.87 mg GAE/100 g phenols (Royani et al., 2023). According to Gonzalez-Delgado et al. (2023), its polysaccharides (60%) include glucomannan (9.17mg/g), acemanaan, pectin, cellulose, hemicellulose, and mannose derivatives. Polysaccharides are well-known for their capacity to bind glucose and fend off oxidative damage. Although *aloe vera* has been effectively used to enhance the quality and stability of a variety of food products (Pratiwi et al., 2024), its application in RFM to maintain emulsion stability and sensory quality throughout storage has not been fully explored. This discrepancy emphasizes the necessity of more studies on AVP as a natural antioxidant and stabilizer to improve RFM's shelf life and sensory acceptability. This study's objective is to assess how AVP affects RFM's physicochemical quality and sensory attributes over the course of a 15-day room temperature storage period.

MATERIALS AND METHODS

This study used raw materials consisting of canola oil, vinegar, and egg yolks from one-day-old fresh chicken eggs, which were obtained from the Teaching Farm, Universitas Brawijaya, Malang. The part used was 20 ml of egg yolk. The RFM formulation included 40 ml of canola oil, 5 ml of vinegar, 0.5 g of white pepper, 1.5 g of salt, 2 g of sugar, 1 g of mustard, and 30 ml of water. AVP, derived from the *Aloe barbadensis Miller* variety, was added as part of the formulation. This study employed a laboratory experimental method with a completely randomized design (CRD). The addition of 6% AVP to RFM was applied, and the samples were stored at room temperature for 0 days (T_0), 5 days (T_1), 10 days (T_2), and 15 days (T_3). Evanuarini and Susilo's (2021) research on reduced-fat mayonnaise made with the same ingredients (canola oil, egg yolk, vinegar, sugar, salt, and pepper) but without any additional natural ingredients served as the basis for the control treatment in this study to compare the antioxidant effect of AVP.

Preparation of Mayonnaise

In the preparation of RFM, mixing was done using a mixer to ensure a stable emulsion was formed. After the optional ingredients (sugar, salt, pepper, and mustard) were added to a container and were mixed at 1500 rpm for one minute, the mixture became uniform. Then, egg yolks were added, and mixing was continued with the mixer until the mixture turned pale yellow and formed a good emulsion. Next, oil and vinegar were added gradually, alternating between them while mixing continuously with the mixer. This step was crucial to form a stable emulsion without phase separation between the oil and water. The use of a mixer ensured that the ingredients were evenly distributed, creating a stable emulsion. Once the emulsion was formed, AVP was added and mixed until fully incorporated.

Preparation of Aloe vera Powder

AVP preparation involved filleting aloe vera leaves to extract the transparent gel, which was washed to remove the slimy layer. The gel was sliced to 5 mm, dried at 60 ± 2°C for 2 hours to reduce moisture to 5%, then ground and sieved through a 200-mesh filter to obtain fine powder. This AVP powder is then added to the RFM at 6% concentration and mixed thoroughly.

Fourier Transform Infrared Spectroscopy Measurement

AVP was characterized using Fourier Transform Infrared (FTIR) spectroscopy (4200-series, KBr mode, DTGS detector) to identify functional groups. FTIR testing was easily performed because the sample was in powder form. The region of the infrared scan results was 400-4000 cm-1 wavenumbers. The stages of FTIR testing began with preparing the sample to be observed. A light source originating from infrared light was prepared, divided into two containers. The first was used to illuminate the sample, while the second was used to illuminate the reference. After that, the process was carried out consecutively through a chopper. The beam of light that has passed through the prism or grating fell directly onto the detector, then was converted into an electrical signal and was automatically recorded by the recorder. If the signal produced was weak, then an amplifier is needed (Al-Lafi and Isam, 2022).

pH Value

pH testing was measured using a pH meter. First, a 2 g sample was prepared, and the pH meter was calibrated using buffer 4 and buffer 7. The electrode on the calibrated device was dipped placed into the sample, the value was allowed to stabilize, and the result was recorded (AOAC, 2005).

Acidity

The acidity was tested using the acid-base titration method (AOAC, 2005). First, a 2 g mayonnaise sample was prepared. The burette was filled with the titrant. Next, the analyte was placed into an Erlenmeyer flask. A few drops of acid-base indicator were added to the analyte. Once a color change was observed in the analyte, the titration was stopped. Finally, the volume of titrant added to the analyte was calculated using the following formula.

$$\text{Acidity (\%)} = \frac{DF \text{ x } mL\ titration\ of\ NaOH \text{ x } N\ NaOH \text{ x } MW}{SW} \text{ x } 100\%$$

Notes: *DF* = *Dilution Factor*
MW = *Molecular Weight*
SW = *Sample Weight*

Viscosity

Viscosity was measured using a Brookfield viscometer. The testing stage was initiated by preparing a 10 g sample. Spindle number 4 was inserted into the sample until it was fully submerged. The motor was then turned on until the spindle rotated. When a stable reading was observed, the motor was turned off, and the results were recorded (AOAC, 2005).

Emulsion Stability

The stability of the mayonnaise emulsion was measured using a centrifuge. Initially, a 10 g sample was prepared and placed into a centrifuge tube. The sample was centrifuged for 15 minutes at a speed of 4000 rpm. The volume of separated oil was measured (AOAC, 2005). The stability of the emulsion was calculated based on the volume of oil separated from the sample. The emulsion stability value was calculated using the formula:

$$Emulsion\ Stability\ (\%) = \frac{SWM - SOV}{SWM} \text{x}100\%$$

Notes:
SWM = *Sample Weight of Mayonnaise*
SOV = *Separated Oil Volume*

Antioxidant Activity

Antioxidant activity was determined using the DPPH radical scavenging method as described in AOAC (2005) with slight modifications. The stability of the mayonnaise emulsion was measured using a centrifuge. Initially, a 10 g sample was prepared and placed into a centrifuge tube. The sample was then centrifuged at 4000 rpm for 15 minutes. The volume of separated oil was measured (AOAC, 2005). The stability of the emulsion was calculated based on the volume of oil separated from the sample. Then calculate the emulsion stability value using the formula:

$$Inhibition\ (\%) = \frac{BA - SA}{BA} \text{x}100\%$$

Notes:
I = *Inhibition*
BA = *Blank Absorbance*
SA = *Sample Absorbance*

Peroxide Value

The principle of the test was to calculate the peroxide number (AOAC, 2005). The test procedure began with preparing a sample of 10 g. After that, the sample was placed into a closed Erlenmeyer flask and 30 mL of a mixture of glacial acetic acid: chloroform (3:2 v/v) was added. 0.5 mL of KI solution was added and left for 1 minute while shaking. After that, 30 mL of distilled water was added. The iodine released by the peroxide was titrated with 0.1015 N sodium thiosulfate solution (Na2SO$_3$) with starch indicator until the blue color disappears. The peroxide number was expressed in the following calculations:

$$Peroxide\ Sample\ (\%) = \frac{(A-B)x\ N\ x\ 1000}{SWM\ (g)}$$

Notes:
PS = Peroxide Sample
SWM = Sample Weight of Mayonnaise
A = Sample titration
B = Blank titration
N = Normality of Na_2SO_4

Sensory Evaluation

Sensory evaluation was based on the assessment of semi-trained panelists using a hedonic scale with a value range of 1-5. Panelists were asked to assess four attributes, namely aroma, color, texture, and Acceptance level (Evanuarini and Nidhal, 2023).

Data Analysis

Data were analyzed using the latest version of SPSS software (e.g., SPSS version 29.0). The pH value, acidity, viscosity, emulsion stability, antioxidant activity, and peroxide value were checked using analysis of variance (ANOVA), while sensory evaluation was assessed using descriptive methods. If there was a significant difference (P<0.05) or a highly significant difference (P<0.01), it was considered in determining treatments effects.

RESULTS AND DISCUSSION

Fourier Transform Infrared Spectroscopy

The FTIR test results on AVP showed absorption at wave numbers 3300.18–3894.73 cm^{-1}, indicating the presence of hydroxyl groups (–OH). This group is polar, capable of forming hydrogen bonds with water, egg yolk protein, and polysaccharides, thereby increasing water binding capacity, viscosity, and emulsion stability by forming a hydrophilic network that prevents coalescence and extends shelf life. Absorption at 2929.66 cm^{-1} shows a methyl group (–CH_3), which does not mix well with water but can bond with oil. Wave number 2340.86 cm^{-1} indicates the presence of carbon dioxide as a minor compound. Absorption at 1723.33 cm^{-1} indicates a carbonyl group that can form hydrogen bonds and help increase emulsion stability. The number 1013.89 cm^{-1} shows an ether group (C–O–C) that can connect with fat and protein using van der Waals forces and hydrogen bonds, which helps make the structure stronger and prevents separation. Meanwhile, the range of 542.85–835.82 cm^{-1} indicates the presence of a carbon group (Quoc, 2022). The FTIR spectrum is shown in Figure 1.

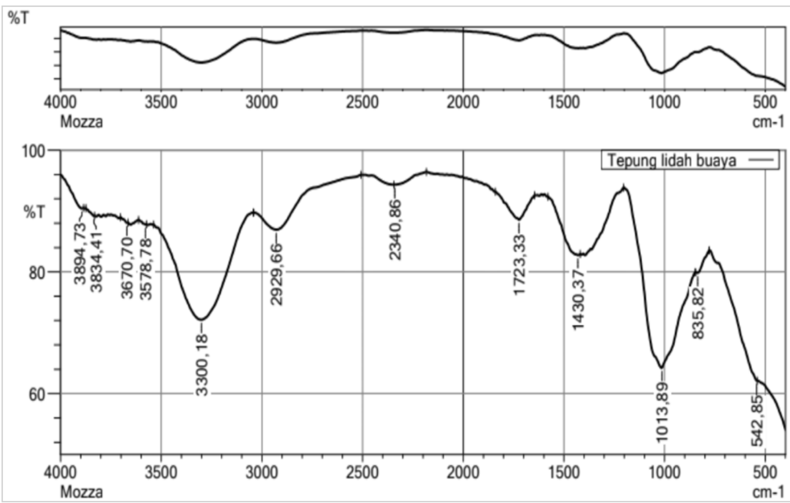

Figure 1. FTIR chromatograph of AVP

Table 1. The results of physicochemical quality testing of RFM with the addition of 6% AVP

Treatment	pH ± SD	Acidity (%) ± SD	Viscosity (cP) ± SD	Emulsion Stability (%) ± SD	Antioxidant Activity (%)± SD	Peroxide Value (meq/kg) ± SD
T_0	3.78 ± 0.06^d	0.45 ± 0.01^a	3874 ± 121.57^a	95.95 ± 0.22^a	17.60 ± 0.43^d	0.28 ± 0.08^a
T_1	3.67 ± 0.02^c	0.50 ± 0.02^a	3775 ± 76.42^a	95.26 ± 0.05^b	16.10 ± 0.39^c	0.44 ± 0.05^b
T_2	3.58 ± 0.02^b	0.54 ± 0.01^b	3642 ± 87.27^b	94.92 ± 0.04^c	15.24 ± 0.15^b	0.60 ± 0.10^c
T_3	3.49 ± 0.01^a	0.63 ± 0.06^b	3521 ± 46.79^b	93.90 ± 0.03^d	13.56 ± 0.63^a	0.84 ± 0.09^d

***Note:** ^{a,b,c,d} Different notations in the same column indicate a highly significant difference *(P<0,01)*.

pH Value

Storage time significantly affected the pH of mayonnaise (P < 0.01), with a gradual decrease over 15 days. During this period, it helps prevent fat oxidation and inhibits the growth of bacteria that produce free fatty acids and glycerol, proteins into amino acids, and polysaccharides into simple sugars. Fatty acids and amino acids are acidic, while sugars can be fermented by microbes into organic acids. All of these results cause a decrease in pH and affect product stability. The decrease in pH value in RFM is caused by hydrolysis and oxidation of fat (Shayganni et al., 2021). The decrease in pH value is also caused by egg yolks containing the enzyme lipase, which can degrade fat into fatty acids so that the pH value decreases (Sanei et al., 2025). The pH value in Table 1 shows a decrease from day 0 to day 15 of storage, a decrease of 7.6%. These results indicate that the pH value of RFM decreases less when AVP is added compared to low-fat mayonnaise containing 8.8% apple peel extract (Khalid et al., 2021). This can be compared because AVP and apple peel both contain antioxidants. AVP is more effective in maintaining the pH of RFM because it contains antioxidants such as phenols and vitamins C and E. These components help prevent fat oxidation and inhibit the growth of acid-producing bacteria.

Acidity

The results indicated that the acidity value of RFM was significantly affected by storage time (P<0.01). The increase in acidity in RFM containing aloe vera can also be influenced by the degradation of bioactive compounds such as phenolics and flavonoids during storage. These compounds can be oxidized and form secondary acid compounds, which contribute to increased acidity. Also, when aloe vera mixes with ions from other ingredients, it can cause a small chemical reaction that creates acidic compounds without needing bacteria to be involved. This reaction is reinforced by the process of fat hydrolysis, which produces free fatty acids; the acidity of RFM increases with storage time (Chinenye et al., 2024). On the 15th day, RFM with the addition of AVP showed an increase in acidity of 40%, increasing from 0.45% to 0.63%. This is in line with RFM research, which shows that Rosa canina extract increases acidity by 67.5%, from 0.74% to 1.24% on the 15th day (Cardullo et al., 2024). When looking at the study by Evanuarini and Susio (2021), the acidity of RFM without any treatment was 0.90%, which is higher than the acidity of RFM with 6% AVP added. These findings show that the antioxidant properties of AVP can attach to free radicals and stop the growth of microorganisms that create acid while they break down food, which helps increase the amount over time during storage.

Viscosity

The results of this study indicate that storage time affects the viscosity value. The amount of hydroxyl groups (-OH) in grape skin extract added to RFM backs up this conclusion because it has been shown to help keep viscosity lower compared to other treatments. This viscosity is caused by the degradation of proteins that coat oil droplets and the decreased function of egg yolk as an emulsifier. This is in accordance with research that explains that damage to egg yolk protein causes the loss of emulsifying properties (Jiang et al., 2024). In Table 1, RFM with the addition of AVP experienced a 9% decrease in viscosity during storage for 15 days; this decrease in value is lower than the control mayonnaise without the addition of natural antioxidants, which experienced a decrease of up to 35% during storage for 2 weeks (Ahamad et al., 2024). This happens because the FTIR results of aloe vera flour contain hydroxyl groups (-OH) in the form of glucomannan, which bind water so that it inhibits the movement of the water phase and oil phase. The presence of hydroxyl groups (-OH) in grape skin extract added to RFM backs up this conclusion because it has been shown to help keep the viscosity from decreasing as much compared to the control treatment.

Emulsion Stability

The emulsion stability value was found to be significantly influenced by the storage period according to the analysis of variance ($P < 0.01$). The decrease in the emulsion stability value was proportional to the decrease in viscosity. Table 1 shows that the decrease in viscosity value caused by the protein degradation process causes the oil phase to merge into one while the water phase separates. This finding is reinforced by research that states that coalescence of oil droplets triggers a decrease in emulsion stability (Taghavi et al., 2024). The emulsion stability value in RFM, with an addition of 6%, is 93.90% after a storage period of 15 days, as shown in Table 1. This value shows that it can maintain the emulsion stability value during the storage period because, when compared to the control treatment, according to Evanuarini and Susilo (2021), the emulsion stability value is 96.92%. This supports the role of AVP containing polyphenols, proving that it can prevent the separation of oil and water phases caused by coalescence and has natural or synthetic antioxidants, thereby inhibiting the decrease in emulsion stability (Jia et al., 2023). Adding natural wheat starch to mayonnaise with polyphenols as an antioxidant can help increase the surface charge, which stops oil droplets from merging together. This study supports the role of AVP containing polyphenols, which can also prevent the separation of oil and water phases caused by coalescence (Kara et al., 2024).

Antioxidant Activity

The results of the analysis of variance test showed that storage time had a very significant effect ($P < 0.01$) on the antioxidant activity value. Table 1 shows a decrease in the antioxidant activity value. This is because, during storage, phenolic compounds from aloe vera can bind to proteins from egg yolks or polysaccharides such as pectin and glucomannan. This bond creates a complex that makes it harder for free phenolic compounds to fight free radicals, leading to a decrease in antioxidant activity, even though the total amount of phenols stays the same. Table 1 shows a decrease in antioxidant activity of 22% in RFM with the addition of AVP for 15 days of storage. This decrease is lower than in low-fat mayonnaise in the control treatment without the addition of natural antioxidants; the decrease is around 34% for 15 days of storage (Chinenye et al., 2024). In comparison to the findings of Evanuarini and Susilo (2022), the control treatment of RFM using the same ingredients as this study had only 8.60% antioxidants, while RFM with 6% AVP after 15 days of storage had 13.56%. This demonstrates that the antioxidant content, specifically vitamin E and phenol, can ward off free radicals, inhibit fat oxidation, and thereby help maintain product quality during its shelf life (Turker et al., 2024).

Peroxide Value

Storage time has a very significant effect ($P < 0.01$) on the RFM peroxide number. This experiment proves that the combination of canola oil with AVP, which is high in antioxidants, can suppress free radicals and inhibit the ability of antioxidant content to ward off free radicals (Daci et al., 2024). Table 1 shows an increase in the peroxide number during the storage period from 0.28 meq/kg to 0.84 meq/kg. This increase is relatively lower than the study of low-fat mayonnaise made from chia oil (control) without the addition of natural antioxidants, which produced a significant increase in the peroxide number from 1.36 meq/kg to 15.27 meq/kg during a storage period of 15 days (Bodoira et al., 2024). This result proves that the combination of canola oil with AVP, which is high in antioxidants, can suppress free radicals and inhibit rancidity.

Sensory Evaluation

Table 2. Sensory Evaluation oF RFM with addition 6% AVP during storage

Treatment ± SD	Aroma ± SD	Color± SD	Texture± SD	Acceptance level ± SD
W_0	4,72 ± 0,46[c]	4,64 ± 0,49[b]	4,72 ± 0,46[c]	4,80 ± 0,41[c]
W_1	4,24 ± 0,66[b]	4,32 ± 0,48[b]	4,40 ± 0,50[b]	4,48 ± 0,51[b]
W_2	3,88 ± 0,73[a]	3.96 ± 0,61[a]	3,76 ± 0,44[ab]	4,24 ± 0,52[b]
W_3	3,68 ± 0,48[a]	3,64 ± 0,49[a]	3,60 ± 0,50[a]	3,60 ± 0.50[a]

***Note:** [a,b,c,d] Different notations in the same column indicate a highly significant difference *(P<0,01)*.

Sensory evaluation is essential for determining the acceptability of mayonnaise with the addition of AVP. The results of the sensory evaluation are presented in Table 2.

The results of the analysis of variance test have a very significant effect (P < 0.01) on the quality of RFM aroma. Table 2 shows a decrease in score panellists from 4.72 to 3.68. This occurs on the first day of storage; RFM has a fresh and non-fishy aroma, while with increasing storage time, the RFM aroma becomes slightly more acidic due to fat oxidation, fishy odor, and less protein degradation (Mu et al., 2024).

The analysis of variance test showed that storage time had a very significant effect (P<0.01) on score panellists the color quality of RFM with the addition of AVP. Table 2 shows a decrease in the value of the color indicator from 4.64 to 3.64. This is because the panel prefers fresh RFM with a fresh yellow color compared to storage on the 15th day. The color of RFM changes to brownish yellow due to fat oxidation (Wang et al., 2022).

The result of the analysis of variance showed that storage time had a highly significant effect (P<0.01) on the texture value of reduced-fat mayonnaise (RFM). The texture values tended to decrease as storage time increased, ranging from 4.72 to 3.60. The resulting mayonnaise became more runny, less viscous, and began to show phase separation between the oil and water phases. The decline in mayonnaise texture quality was attributed to lipid oxidation, which reduced its viscosity. This finding is consistent with the statement by Wang et al. (2022), who reported that mayonnaise stored for 20 days experienced a decrease in viscosity and texture thickness due to lipid oxidation. Lipid oxidation disrupts the bonds between the oil and water phases, leading to a deterioration in mayonnaise texture.

The analysis of variance test showed that storage time had a very significant effect on the level of RFM acceptance (P <0.01). Table 2 shows a decrease in value from 4.80 to 3.60. The product remained acceptable after 5 days, maintaining a fresh aroma, appealing yellow color, and thick texture. However, by days 10 to 15, oxidation and microbial activity led to sour aroma, brown discoloration, and watery texture, reducing panelist acceptance. This trend aligns with Yantewo et al. (2024), who also observed declining acceptance in mayonnaise with red fruit extract over time. When compared with the research of Evanuarini et al. (2020), it was stated that the sensory evaluation of the control treatment without the addition of natural additives had a slightly more liquid texture and a somewhat fishy aroma but an attractive color, while the overall results of the addition of AVP and RFM had a fresher aroma, thicker texture, and attractive color so that the panelists were more accepting.

CONCLUSION

AVP has the potential to maintain the physicochemical and organoleptic quality of RFM during storage due to its antioxidant content and polysaccharides. The antioxidant compounds play a role in inhibiting lipid oxidation, thereby slowing the decrease in pH and the increase in acidity during storage. The main polysaccharide components, namely glucomannan and acemannan, contributed to maintaining viscosity and emulsion stability throughout the storage period. These findings suggest that AVP serves a dual function as a functional antioxidant and a structural stabilizing agent in emulsion-based food systems. Further studies on microbial stability, food safety, and shelf life determination are recommended to optimize its application in commercial mayonnaise formulations.

ACKNOWLEDGMENT

The author sincerely thanks the corresponding author and advisor, Prof. Dr. Ir. Herly Evanuarini, for her systematic scientific guidance and valuable input in revising the journal content. Deep appreciation is also extended to my advisor, Dr. Premy Puspitawati Rahayu, for her insightful contributions throughout the research and journal preparation process. Furthermore, gratitude is expressed to the Faculty of Animal Science, Universitas Brawijaya, for its support and the facilities that enabled the completion of this research.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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