

### 3 RESULTS

The obtained data collected from physical, chemical, and sensory analysis—the physical analysis of non-dairy creamer conducted on the coffee test, bulk density, and flow-ability. The chemical analysis of non-dairy creamer consists of fat content, ash content, protein content, and moisture content. The physical and chemical analysis conducted twice, using a pilot plan sample and scale-up production sample. Sensory analysis of non-dairy creamer conducted based on group discussion and sensory test by AMC with a minimum number of 30-screened panelists. The sensory analysis aimed to find any differences and how big the difference is between the fifth samples provided. PT. Kievit Indonesia has several product specifications used as standard, VB 60s is one of the NDC products containing 60% fat and has some of the specifications, as shown in Table 6.

Table 6. VB 60s Finished Product Specification

Macro nutrients per 100g						
Nutrient	UoM	Value	Min Value	Max Value	Method	CoA
Energy (kcal)	kcal	677				
Energy (kJ)	kJ	2.800				
Protein	g	4.4	4.0	6.0	ISO 16634:2000	
Fat	g	60.5	59.5	61.5	NPR 3168:2002	
Minerals per 100g						
Nutrient	UoM	Value	Min Value	Max Value	Method	CoA
Sodium	mg	125			calculated	
Ash	g	4.6		5.0	Modified FIL-IDF 27:1964/90:1979	
Physical Chemical Properties						
Characteristic	UoM	Value	Min Value	Max Value	Method	CoA
Moisture	%	1.9		2.3	IDF 26A	A
Bulk density, Engelsmann 300 taps	g/L		460	530	Internal method	A
Particles, Scorched				Disc A	ADPI	A
Sensory						
Characteristic	Description					

Flavor	Conform standard
Texture	Powder
Color	White/light yellow

### 3.1 Effect of Different Emulsifier Based on Fat Content

The fat content of non-dairy creamer shown in Table 7 and Figure 4. Table 7 showed the fat content of non-dairy creamer in the form of means and standard deviations. The research showed that the fat content of non-dairy creamer was not affected by the replacement of an emulsifier. Gerber Method measured the fat content, and it should have a figure of around 59.5% - 61.5%.

Table 7. Pilot Plan Fat Content Analysis

Non Dairy Creamer	Fat Content (%)
S0161	55.62 ± 0.023 <sup>a</sup>
S0162	61.05 ± 0.005 <sup>a</sup>
S0163	60.39 ± 0.012 <sup>a</sup>
S0164	57.98 ± 0.015 <sup>a</sup>
S0165	59.89 ± 0.006 <sup>a</sup>
VB 60s	58.55 ± 0.015 <sup>a</sup>

The values are mean ± standard deviation.

The values within the same column followed by different superscripted letters were not significantly different between each addition of emulsifier ( $P \geq 0.05$ ) based on Duncan's test.

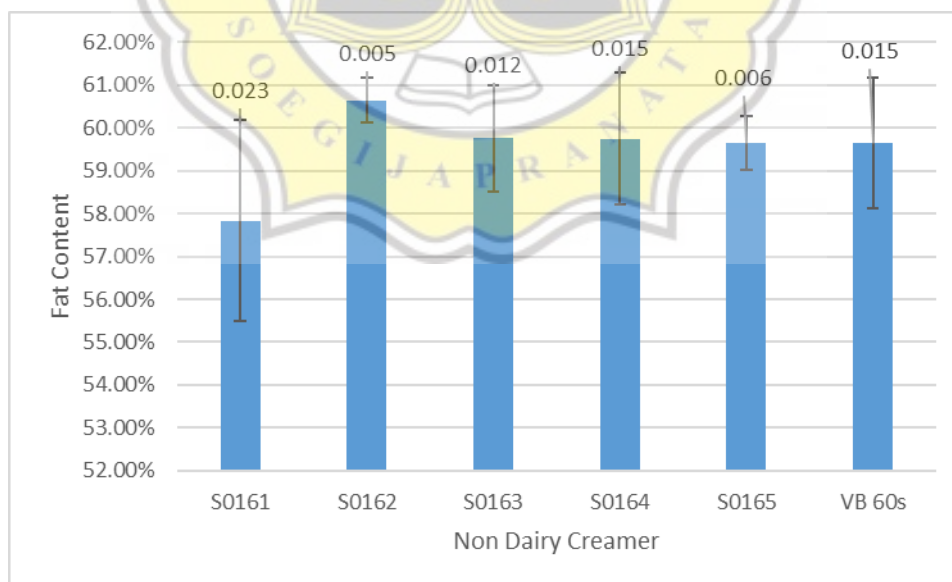


Figure 4. Pilot Plan Fat Content Analysis

### 3.2 Effect of Different Emulsifier Based on Ash Content

The ash content of non-dairy creamer is shown in Table 8 and Figure 5. Table 8 showed the ash content of non-dairy creamer in the form of means and standard deviations. This analysis is carried out based on the drying method and measuring the weight of the cup. The data below shows the average ash content of each non-dairy creamer that meet the standard, which should not be more than 5%.

Table 8. Pilot Plan Physical Ash Content Analysis

Non Dairy Creamer	Ash Content (%)
S0161	4.11 ± 0.000 <sup>c</sup>
S0162	4.15 ± 0.000 <sup>bc</sup>
S0163	4.14 ± 0.000 <sup>bc</sup>
S0164	4.29 ± 0.000 <sup>a</sup>
S0165	4.29 ± 0.001 <sup>ab</sup>
VB 60s	4.81 ± 0.000 <sup>a</sup>

The values are mean ± standard deviation.

The values within the same column followed by different superscripted letters were not significantly different between each addition of emulsifier ( $P \geq 0.05$ ) based on Duncan's test.

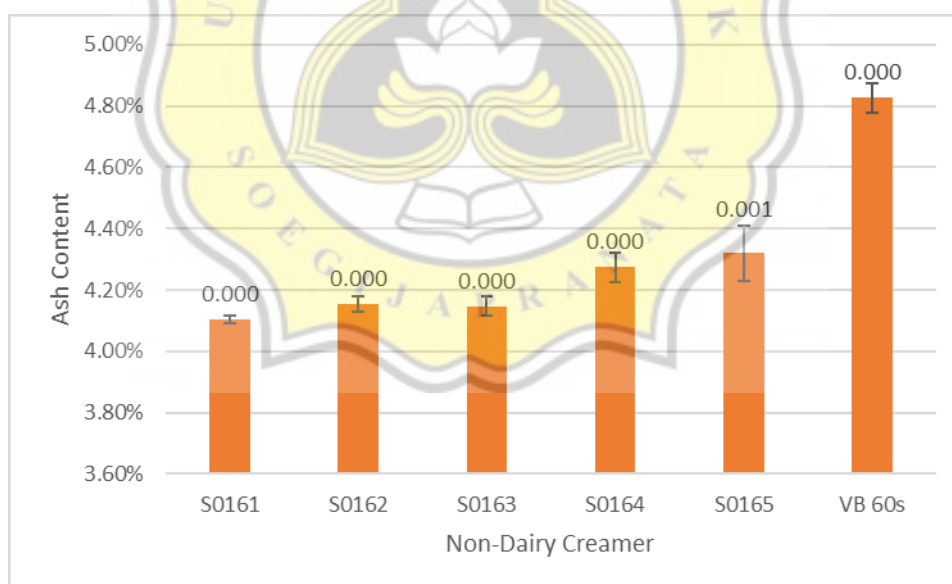


Figure 5. Pilot Plan Physical Ash Content Analysis

### 3.3 Effect of Different Emulsifier Based on Protein Content

The protein content of non-dairy creamer is shown in Table 9 and Figure 6. Table 9 shows the protein content of non-dairy creamer in the form of means and standard deviations. The protein measured by the Kjeldahl method and the average protein content for each sample

has the minimum number 4.36%, and the maximum number 4.56%, which is, meet the standard of protein content; 4.00%-6.00%.

Table 9. Pilot Plan Protein Content Analysis

Non Dairy Creamer	Protein Content (%)
S0161	4.56 ± 0.026 <sup>a</sup>
S0162	4.40 ± 0.012 <sup>ab</sup>
S0163	4.36 ± 0.166 <sup>b</sup>
S0164	4.40 ± 0.015 <sup>ab</sup>
S0165	4.40 ± 0.211 <sup>b</sup>
VB 60s	4.40 ± 0.020 <sup>ab</sup>

The values are mean ± standard deviation.

The values within the same column followed by different superscripted letters were not significantly different between each addition of emulsifier ( $P \geq 0.05$ ) based on Duncan's test.

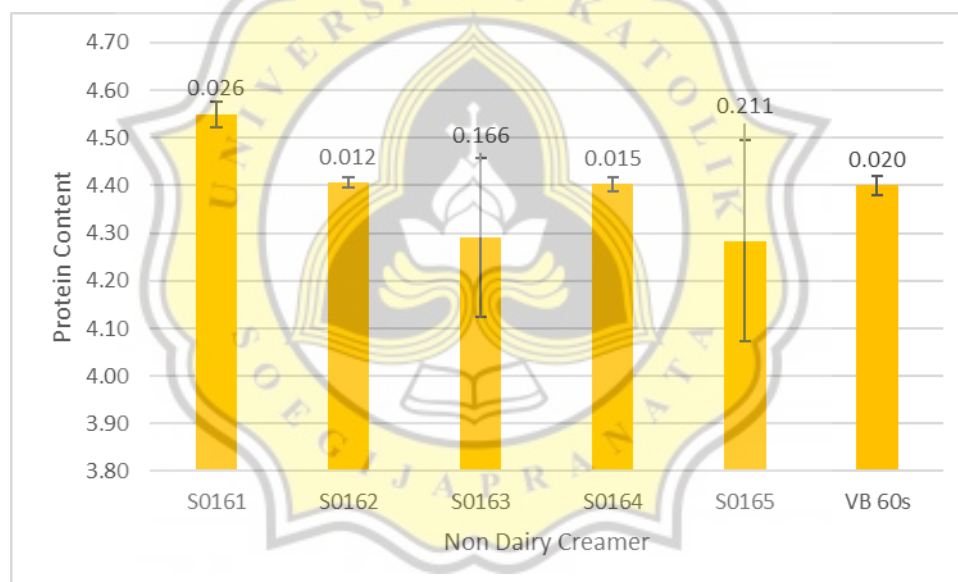


Figure 6. Pilot Plan Protein Content Analysis

### 3.4 Effect of Different Emulsifier Based on Moisture Content

The moisture content of non-dairy creamer is shown in Table 10 and Figure 7. Table 10 shows the moisture content of non-dairy creamer in the form of means and standard deviations, the moisture measured by the drying method. The average moisture content for each sample has a minimum 0.66%, and the maximum number is 1.67%, which meets the standard of moisture content below 2.3%.

Table 10. Pilot Plan Moisture Content Analysis

Non Dairy Creamer	Moisture Content (%)
S0161	1.33 ± 0.420 <sup>a</sup>
S0162	1.35 ± 0.618 <sup>a</sup>
S0163	0.83 ± 0.583 <sup>a</sup>
S0164	0.66 ± 0.487 <sup>a</sup>
S0165	1.39 ± 0.405 <sup>a</sup>
VB 60s	1.67 ± 0.394 <sup>a</sup>

The values are mean ± standard deviation.

The values within the same column followed by different superscripted letters were not significantly different between each addition of emulsifier ( $P \geq 0.05$ ) based on Duncan's test.

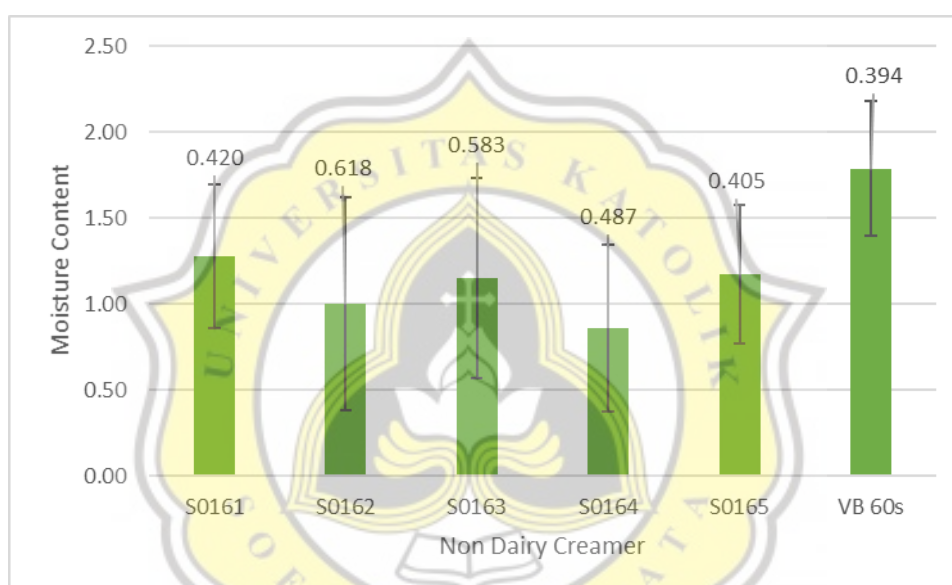


Figure 7. Pilot Plan Moisture Content Analysis

## Physical Characteristic

### 3.5 Effect of Different Emulsifier Based on Bulk Density

The bulk density value of Pilot plan Vana Blanca 60 Fat Rapeseed Oil Based Emulsifier is shown in Table 11 and Figure 8. Table 11 shows the bulk density of non-dairy creamer in the form of means and standard deviations. Stampfvolumeter measured the bulk density; the average value of each sample's bulk density has a value that meets the standard.

Table 11. Pilot Plan Physical Bulk Density Tap Analysis

Non Dairy Creamer	Bulk Density (g/L)
S0161	486.00 ± 3.225 <sup>bc</sup>
S0162	486.58 ± 3.277 <sup>cd</sup>

S0163	$509.47 \pm 9.305^a$
S0164	$476.97 \pm 2.588^d$
S0165	$482.00 \pm 2.177^{cd}$
VB 60s	$492.57 \pm 6.902^b$

The values are mean  $\pm$  standard deviation.

The values within the same column followed by different superscripted letters were not significantly different between each addition of emulsifier ( $P \geq 0.05$ ) based on Duncan's test.

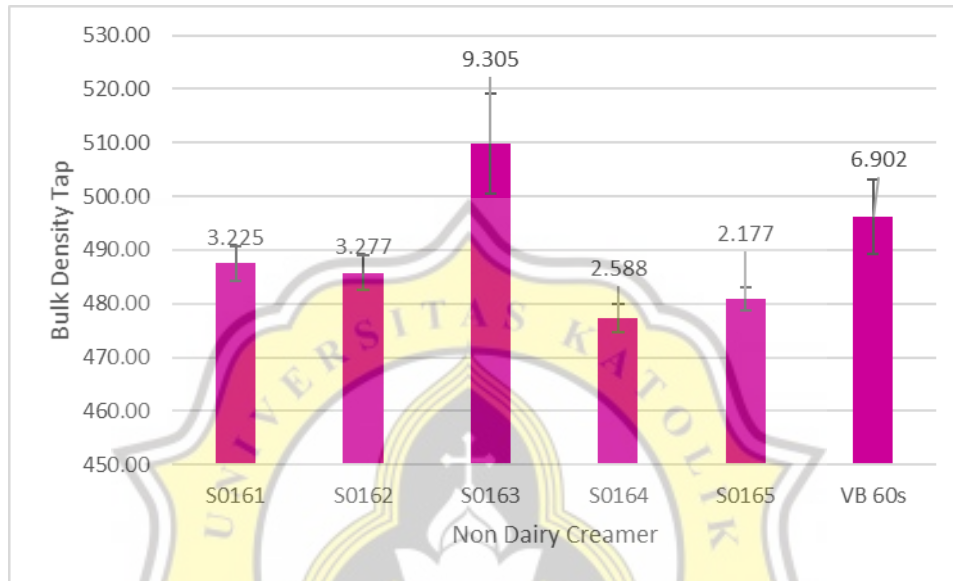


Figure 8. Pilot Plan Physical Bulk Density Tap Analysis

### 3.6 Effect of Different Emulsifier Based on Coffee Test

The result of the coffee test of non-dairy creamer is shown in Table 12 and Table 13. The table shows the results of the pH and coffee test, including sink ability, white spot, and fatty eyes of non-dairy creamer. Sink ability means the time in second the coffee creamer needs to disappear below the surface of the coffee solution and should not exceed 12 seconds. White spots are visible as white dots that known as an undissolved component; white spots should be present at the surface of the coffee with an amount of large and small dots. Fatty eyes mean little fatty balls are floating on the surface of the solution.

Table 12. Pilot Plan Coffee Test

Sample	S0161	S0162	S0163	S0164	VB 60s
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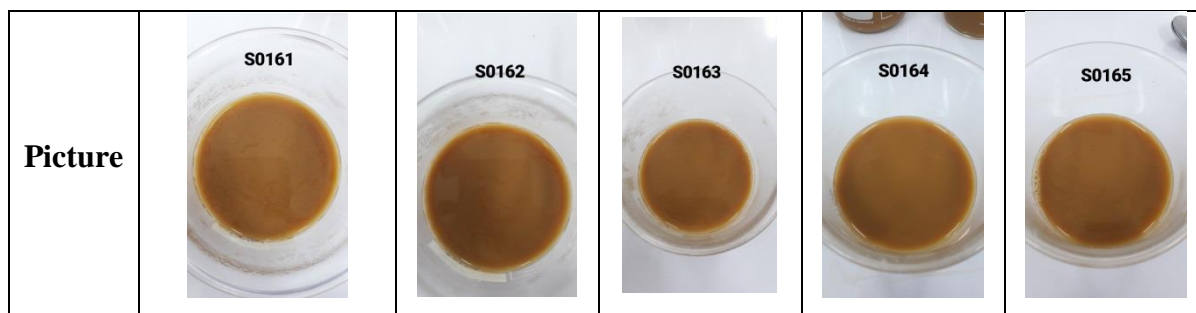


Table 13. Pilot Plan Coffee Test Result and pH

		S0161	S0162	S0163	S0164	VB 60s
<b>Coffee Test</b>	<b>White Spots</b>	2	0	0	0	0
	<b>Fatty Eyes</b>	0	0	0	0	0
	<b>Sink ability (s)</b>	7	6	6	5	6
<b>pH</b>		7.52	7.58	7.54	7.58	7.59

## Sensory Analysis

### 3.7 Effect on Different Emulsifier Based on Sensory Test

The sensory analysis of non-dairy creamer conducted in 3in1 Coffee is shown in Table 14, White Coffee is shown in Table 15, 10% Solution is shown in Table 16, and the CAR method result by AMC (Alaska Milk Corporation) is shown in Table 17. All the sensory tests conducted based on internal group discussion.

Table 14. Sensory PP 60s in 3 in 1

<b>VB 60 Fat Rapeseed Oil Based Emulsifier in 3in1</b>	
<b>Sample</b>	<b>Description</b>
S0161	bitter note, less creamy, and less milky
S0162	Both are similar and need to be improve on the mouthfeel
S0163	
S0164	Balance between the sweet and bitter taste
VB 60s (ref)	creamy and sweet

From Table 14, it can be concluded that the difference between the samples is not significant. However, S0164 is the closes with the reference following with S0163 and S0162, while S0161 has a high coffee note, which also gives a bitter taste, less creamy, and less milky.

Table 15. Sensory PP 60s in White Coffee

<b>VB 60 Fat Rapeseed Oil Based Emulsifier in White Coffee</b>	
<b>Sample</b>	<b>Description</b>
S0161	more coffee, less creamy
S0162	
S0163	more coffee, less creamy, milky, sweet, color: brighter
S0164	less coffee, more caramel, creamy, milky, sweet color: brighter
VB 60s	less creamy, milky, less coffee
White Coffee Good Day	Flavory

From Table 15, it can be concluded that Good Day White Coffee has a strong flavor that causes covering all the attributes. S0161, S0162, S0163 is in a group and the most preferred sample, following with Vana Blanca 60 Fat produced in Salatiga.

Table 16. Sensory PP 60s in 10% Solution

<b>VB 60 Fat Rapeseed Oil Based Emulsifier in 10%</b>	
<b>Sample</b>	<b>Description</b>
S0161	the taste really different, less rounded
S0162	Between these 4 samples, the taste are not really significant and getting better.
S0163	
S0164	
VB 60s (Ref)	

From Table 16, it can be concluded that the difference between these five samples is not significant. However, S0164 is the closes with the reference following with S0163 and S0162, while S0161 is worse because the taste is different from the others, which has the less rounded coffee taste and have a thin mouthfeel.

Table 17. CAR Test Result

<b>CAR test result Project Rainforest in Coffee Application</b>							
<b>Attribute</b>	<b>Sample/Product</b>						
	<b>Ref</b>	<b>S0161</b>	<b>S0163</b>	<b>S0165</b>	<b>S0164</b>	<b>60S</b>	<b>S0162</b>
Thin and Brown Appearance	50.00 =	49.02 =	49.19 =	47.93 =	47.40 =	48.95 =	50.17 =
Strong Coffee Odor	50.00 =	48.75 =	49.95 =	48.36 =	47.43 =	49.95 =	48.62 =
Coffee Intensity Taste	50.00 =	51.05 =	49.22 =	49.04 =	46.67 =	47.41 =	49.24 =
Creamy Taste	50.00 =	47.29 =	49.00 =	50.26 =	46.82 =	51.21 =	49.70 =
Bitter Taste	50.00 =	49.86 =	49.10 =	49.34 =	46.66 =	47.04 =	48.06 =
Sweet Taste	50.00 =	51.77 =	50.65 =	49.90 =	47.86 =	49.77 =	49.96 =



Smooth Mouthfeel	50.00 =	48.72 =	49.51 =	49.71 =	48.39 =	49.18 =	49.17 =
Creamy After Taste	50.00 =	47.04 =	48.65 =	50.47 =	46.97 =	50.82 =	49.63 =
Sour After Taste	50.00 =	48.82 =	49.17 =	47.86 =	47.54 =	46.07 =	49.93 =

**For Dunnett, the interpretation of the groups is a follow:**

- |   |
|---|
| *+: the products are significantly more than Ref at 5%          |
| *=: the products are not significantly different from Ref at 5% |
| *-: the products are significantly less than Ref at 5%          |

From Table 17, it can be seen the value of each attribute for all samples tested. The reference has value 50 as a standard, while the other sample has a number around 50 for each attribute. The equals sign “=” means that the products are not significantly different from the reference at 5%, which each sample also has.

