Product Development of *Bir Pletok* (Betawinese Traditional Drink) with Coffee and Vanilla Flavor for Dip Bag Application

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ABSTRACT. *Bir Pletok* is a Betawinese traditional drink made of spices such as ginger, *secang* wood, cinnamon, pandan leaves, lime leaves, cloves, lemongrass, star anise, nutmeg, cardamom, and *mesoyi* wood. Due to its spice and herbs ingredients, this Betawinese traditional drink potentially has health benefits. However, as one of the non-objects of Indonesian cultural heritage, this beverage needs to be preserved its existence. Thus, this research aims to determine the optimal formulation of *Bir Pletok* based on consumer behavior and preference market assessment following consumer acceptance and quality (sensory, microbiology, and antioxidant activity). The market assessment, done through online questionnaires among DKI Jakarta residents, revealed that respondents who prefer *Bir Pletok* with coffee and prefer to drink traditional drinks that are easy to consume comprised the highest percentage. The percentage of DPPH inhibition of selected treatment 3 (T3) (8.1% ginger, 0.2% vanilla, and 6.2% coffee) was significantly higher, and the IC_{50} was significantly lower than the control. These results imply that T3 had a higher antioxidant activity than the control. Both control and T3 met the requirements of the total number of microbes and yeast molds referring to SNI regarding herbs and spices. In addition, the pH value results show that *Bir Pletok* averaged below the value of around 5.0.

Keywords: Antioxidant activity, *Bir Pletok*, Consumer Behavior and Perceptions, DPPH, Sensory Analysis, Total Plate Count.

1. INTRODUCTION

The Dutch colonial era influenced many aspects of the area, now known as Indonesia, including the culture, government system, and many more. The Netherlands culture of drinking beer triggered the Batavi (Betawi) people who lived in Batavia to recreate another version of beer called *Bir Pletok*, which does not contain alcohol due to religious aspects. Batavia, the area corresponds to present-day Jakarta, was the capital of the Dutch East Indies.

Indra Sutisna, the committee marketing management of Betawi Culture Village of Setu Babakan, East Jakarta, mentioned in an interview that the name of *Bir Pletok* origin from the Arab language, *birun* or *abyar*, which means the source of spring water, and *pletok* was taken from the sound that comes out when making of *Bir Pletok*.
Bir Pletok is a traditional Betawi drink made of spices such as ginger, *secang* wood, cinnamon, pandan, lime leaves, cloves, lemongrass, star anise, nutmeg, cardamom, and *mesoyi* wood (Wibawa et al., 2019). *Bir Pletok*'s characteristics are red-brownish and obtained from *secang* wood (Mardianingrum et al., 2021). Making *Bir Pletok* is boiling the water until it is boiled, then putting in the spices that have been washed and crushed, then cooking until flavored for 30-45 minutes, and then straining after it cools down. Afterward, it can be stored, and sugar can be added to increase the sweetness (Silalahi et al., 2023).

However, people's interest in traditional beverages, *Bir Pletok*, is decreasing as cultural heritage is not widespread enough. Hence, research must be carried out as part of the effort to preserve it. Research material on traditional Betawinese drinks, such as *Bir Pletok*, is quite limited, and only limited information is used in making *Bir Pletok*. The formula and process of making *Bir Pletok* are not standardized and can produce inconsistent quality, taste, and flavor. Moreover, *Bir Pletok* is generally inconvenient because the ingredients must be

boiled. Also, non-proper packaging can affect the shelf life of the product. Meanwhile, some people prefer convenient drinks to fresh ones in today's practical era. The reason can be time constraints or simply following the trend.

Therefore, research and study were conducted on the characteristics of *Bir Pletok*, which have consistent formulations and processes to maintain quality. The formulation and process of making *Bir Pletok* must be surveyed to obtain the composition and the process of making *Bir Pletok* by conducting this research in two stages: 1) market assessment to define the product, and 2) product implementation/ formulation and optimization. The drying process can improve shelf life and consumer acceptance. In this study, freeze-drying technology enabled the *Bir Pletok* to be powdered after drying. The advantage of the freeze-drying process is that it can produce high-quality products, low nutritional damage, and minimize changes in color, smell, and taste.

2. METHODOLOGY

The research was conducted at the International University Liaison Indonesia Faculty of Life Sciences Laboratory. The research was conducted in February – May 2019. The main ingredients used in this research are ginger, *secang* wood, cinnamon, pandan leaves, lime leaves, cloves, lemongrass, star anise, nutmeg, cardamom, and *mesoyi* wood. Other ingredients used to make *Bir Pletok* drink are sugar, coffee, vanilla flavor, and water. For analysis, the main materials used were distilled water, 1.1-diphenyl-2-picryl-hydrazil (DPPH) (Sigma-Aldrich Co., St. Louis, MO, USA), methanol, Nutrient Agar, and Dichloran Rose Bengal Chloramphenicol (DRBC) (Himedia, HiMedia Laboratories Pvt. Ltd, Mumbai, India). Meanwhile, the equipments used for analysis purposes include glassware, cooking wares, pH meter, thermometer, analytical balance, blender (Tokebi Plus Hand Blender, Korea), Spectrophotometer (V-1200, VWR, Germany), autoclave (Hiclave HG-50, Hirayama, Japan), incubator (MMM, Medcenter GmbH, Germany), biosafety cabinet (Heal Force, Shanghai Lishen Scientific Equipment Co., Ltd., China), and freeze dryer (Biobase, Biobase Biodusty (Shandong), Co., Ltd, China).

This research was performed in two phases. The first phase determines the market opportunity assessment, and the second phase is product implementation, including sensory and product quality analysis of moisture and microbiological quality, pH value, and antioxidant analysis.

Market Assessment Data Processing and Analysis Method

The determination of *Bir Pletok* product development was made by distributing questionnaires. The questionnaires contain general information about respondents and information about the product. The questions asked in the questionnaire were open and closed types of questions.

The population of DKI Jakarta is 10.467.600 people (BPS, 2018). The sample obtained must be representative. This research reduced the population by calculating the Slovin formulation's sample size (Sugiyono, 2015). The specified margin of error in this research is 5% or 0.05.

$$n = \frac{N}{1 + Ne^2}$$

Where:
N = Number of total populations
e = Margin error

Hence, questionnaire testing was conducted on n = 480 respondents.

Operational Variables (questionnaires)

Based on this research on the topic "Consumer behavior and perceptions in DKI Jakarta on *Bir Pletok* (Betawinese traditional drink) product, The *behavior* variable as an independent variable is denoted as X1 variable, the *perception* variable as X2, and variable *Bir Pletok* as dependent variable is denoted as variable Y as seen in Table 1.

Table 1. Questionnaire questions for market assessment

Variables	**Questions**
-	Apakah Anda mengenal Birpletok?
-	Darimana Anda mengenal Birpletok?
-	Apakah Anda pernah mengkonsumsi Birpletok?
X1	Apakah Anda menyukai Birpletok?
X2	Bagaimana Anda mengkonsumsi Birpletok?
X3	Seberapa sering Anda mengkonsumsi Birpletok?
X4	Apa alasan Anda mengkonsumsi Birpletok? (Bisa pilih lebih dari satu)
X5	Apakah Anda mengetahui khasiat dari Birpletok?
X6	Ketika Anda meninum Birpletok pada suhu berapa biasanya Anda mengkosumsinya?

X7	Menurut Anda apakah bentuk Birpletok yang Anda pilih
X8	Menurut Anda jika birtpletok ditambahkan dengan aroma atau rasa kopi apakah Anda suka?
-	Jika pada birpletok ditambahkan variasi rasa, jenis apa yang Anda sukai untuk minuman Birpletok ? (Bisa pilih lebih dari satu)
X9	Birpletok mempunyai khasiat yang menyehatkan
X10	Apakah Anda setuju bahwa Birpletok adalah minuman tradisional?
X11	Apakan menurut Anda Birpletok menyegarkan ?
Y1	Apakah terdapat pandangan lain terhadap Birpletok ?
Y2	Apakah Anda setuju apabila Birpletok disajikan lebih praktis (Instan)?
Y3	Apakah Anda setuju apabila terdapat varian rasa pada Birpletok ?
Y4	Apakah Anda setuju apabila kemasan pada Birpletok didesain lebih menarik ?
Y5	Apakah terdapat inovasi lain agar Birpletok lebih sering dikonsumsi oleh masyarakat ?

Formulation of Bir Pletok coffee drink

This research began with preparing beverage formulas consisting of ginger, *secang* wood, cinnamon, *pandan*, lime leaves, cloves, lemongrass, star anise, nutmeg, cardamom, *mesoyi* wood, coffee, and sugar.

The wet spices were reduced in size, dried using freeze-dry (Compressor temperature of -60^{o}C, pressure of 200 Pa, overnight), and blended to form a powder. The dry spices were blended until they formed a powder. Then, all the ingredients were mixed. *Bir Pletok* coffee was composed of five formulas. The formula for the beverage is presented in Table 2. The formulation of control has no flavor, while T1 (12% ginger, 0.2% vanilla, and 2% coffee), T2 (11.4% ginger, 1% vanilla, and 2.1% coffee), T3 (8.1% ginger, 0.2% vanilla, and 6.2% coffee), and T4 (7% ginger, 1% vanilla, and 6% coffee) has coffee and vanilla flavor. The Bir Pletok was packaged in dip bags, as seen in Figure 1.

Figure 1. *Bir Pletok* (Betawinese Traditional Drink) in Dip Bag Application.

Sensory analysis

This research used sensory analysis to select powder bases, determine the amount of additional ingredients, and select the final product formula. The hedonic rating test aims to see consumers' acceptance and preferences for *Bir Pletok* coffee drink powder products. Thirty untrained panelists were used. The sample tested was a powder drink of rehydrated raw material (spices) and additional ingredients. The analysis followed Meilgaard et al. (2016).

The rehydration process is done by dissolving the powder in the hot water. 7.5 g of powder was dissolved in 250 ml of water and stirred until it dissolved. The product is prepared by preparing about 20 ml of a sample of *Bir Pletok* coffee previously dissolved in a glass sample, which is marked with a 3-digit random code. Panelists were asked to taste and evaluate the *Bir Pletok* coffee drink sample and give an assessment using a hedonic scale of 5 points: 1 = dislike very much, 2 = dislike moderately, 3 = neither like nor dislike, 4 = like moderately, and 5 = like very much. The panelists involved in the sensory analysis were 30 people between 19 and 25 years old.

Table 2. *Bir Pletok* Formulations

Ingredients	Amount of material and Sample code				
	Control	T1	T2	T3	T4
	(X56)	(X80)	(X76)	(X81)	(X40)
Ginger (g)	7	5.9	5.5	3.9	3.5
Lemorgrass (g)	0.1	0.1	1	0.1	0.1
Clove (g)	1	1	1	1	1
Cardamon (g)	0.2	0.2	0.2	0.2	0.2
Nutmeg (g)	0.3	0.3	0.3	0.3	0.3
Bunga Lawang(g)	0.8	0.8	0.8	0.8	0.8
Pandan leaves (g)	1	1	1	1	1
Secang Wood(g)	2.5	2.5	2.5	2.5	2.5
Sugar(g)	30	30	30	30	30
Cinnamon (g)	4	4	4	4	4
Mesoyi (g)	0.2	0.2	0.2	0.2	0.2
Lime leaves (g)	1	1	1	1	1
Vanilla (g)	0	0.1	0.5	0.1	0.5
Kopi Arabica (g)	0	1	1	3	3
Water (L)	1	1	1	1	1
Total (g)	**48.1**	**48.1**	**48.1**	**48.1**	**48.1**

Data Analysis

Data analysis was conducted using one-way analysis of variance (ANOVA) with the SPSS 23.0 program. A P value or a small significance of 0.05 ($p < 0.05$) was considered to have a statistically significant difference.

Total plate count (BSN, 2009)

Bir Pletok, coffee powder samples were weighed for five grams and poured aseptically into 45 ml sterilized 0.85% NaCl solution in Erlenmeyer. The solution was shaken until the powder dissolved entirely and then labeled. A serial dilution was done until it reached a dilution of 10^{-4}. Each dilution was homogenized by shaking it. Each dilution was taken as much as one ml and then out into a petri dish containing PCA (Plate Count Agar). The plating method used was the pour plate. The plating that had been finished was then labeled and put into an incubator for 48 hours at 30°C. The colonies formed were then calculated using the formula:

a. If the number of colonies is 30-300

$$N = \frac{\Sigma C}{(1 \times n1)\, n + n\, (0.1xn2) \times d}$$

b. If the number of colonies is < 30 = TFTC (Too Few To Count)
c. If the number of colonies is more than 300 = TNTC (Too Numerous To Count)

Where:

N = Number of product colonies, expressed in colonies per ml or colonies per gram
∑C = The number of colonies in all the plates calculated
n1 = The number of petri dish in the first dilution is calculated
n2 = the number of petri dish in the second dilution is calculated
d = The first dilution calculated

Total Mold and Yeast (BSN, 2009)

The same sample preparation as for TPC was done for total mold and yeast. Furthermore, DRBC (Dichloran Rose Bengal Chloramphenicol) media liquid was poured into the Erlenmeyer, which added 0.1 ml of sample. Immediately after pouring, the petri dish was moved on the table carefully to spread the microbial cells evenly, with a circular motion or number eight. After the medium became solid, the petri dish was incubated in the inverted position at an incubator temperature of 30°C for three days (72 hours).

pH Value

Thirty to fifty ml of *Bir Pletok* was measured directly for their pH value using a pH meter. Before use, the pH meter was calibrated with pH 4.0 and pH 7.0 buffer solutions.

Moisture Content

The aluminum cup was dried in the oven for 15 minutes, cooled down in a desiccator for 10 minutes, and weighed (A), then the sample (*Bir Pletok* powder) was weighed ± 2 grams in the cup (B). After that, the cup and the contents were dried at temperature of 100°C in an oven for six hours and then transferred to the desiccator. When it was cold, the cup and its contents were dried again until a constant weight (C) was obtained.

$$Moisture\ content\ (\%) = \frac{B - (C - A)}{C - A} \times 100\%$$

Antioxidant Activity (DPPH and IC_{50})

Antioxidant activity analysis followed (Brand-Williams et al., 1995) with modifications. Samples of 0.4 ml of instant *Bir Pletok* coffee were mixed with 250 ml of methanol 80% solution containing DPPH 0.14 mM. The mixture was then vortex and incubated for 30 minutes at room temperature (± 27°C). After that, the sample was analyzed using spectrophotometry at a wavelength of 517 nm. Methanol containing DPPH was used as the blank solution. The results were expressed in percent DPPH radical capture. The DPPH activity was computed using the equation as follows:

$$Inhibition\ \% = \frac{[A\ blank - A\ sample]}{A\ blank} \times 100\%$$

For IC50, the most straightforward estimate was to plot x-y and fit the data using a straight line or linear regression. The IC_{50} was done by several dilutions of 20, 40, 60, 80, 100, and 120 ppm. IC_{50} value was then calculated using the following equation:

$$Y = a\,X + b$$
$$IC_{50} = \frac{50 - b}{a}$$

Correlation Analysis

Partial correlation analysis was utilized to determine the relationship's stregth between the correlations of the two variables where other variables considered influential are controlled or made constant (as a control variable). The statistical technique used was Pearson Correlation Product Moment (Sugiyono, 2013) by using the formula as follows:

$$r_{xy} = \frac{n\sum x_i y_i - (\sum x_i)(y_i)}{\sqrt{\{n\sum {x_i}^2 - (\sum x_i)^2\} - \{n\sum {y_i}^2 - (\sum y_i)^2\}}}$$

Where:

r_{xy} = Pearson correlation coefficient
x_i = Independent Variable
y_i = Dependent Variable
n = Amount of sample

3. RESULT

Bir Pletok Traditional Drink Market Assessment

The survey was conducted on respondents who had consumed *Bir Pletok* drink products and lived in DKI Jakarta. The purpose of selecting this respondent is to have the questionnaire filled out by the respondents who understood and knew about *Bir Pletok*.

Based on gender differences, most respondents who consumed *Bir Pletok* in this study comprised 68 % females and 32 % males. The age level of respondents was not limited, considering that *Bir Pletok* consumers are of all ages (except babies). However, the chosen respondents were over 14 years old when the implementation began. This minimum age was selected because, at this age, the respondents can fill out a questionnaire and express their opinions without being influenced by others.

Based on the survey results, most respondents who consumed *Bir Pletok* were respondents aged between 17-25 years (85%), while the rest were in order of number, respondents who were 9%, respondents aged 26-35 years old, 2% of each 36-45 years old, and aged 46-55 years old, 1% each for and 14-16 years old and 56-65 years old groups.

Consumer survey results based on respondents' professions show that most respondents (70%) who consumed *Bir Pletok* were students, and 13% were employees. The remaining 9% were entrepreneurs, 3% were housewives, and 5% had other professions.

Most Jakarta residents come from outside the city, so many ethnic groups live in Jakarta. This questionnaire included eleven ethnic groups: Sumatera, Bataknese, Banten, Betawi, Javanese, Sundanese, Bali, North Sulawesi, South Sulawesi, Kalimantan (Borneo), and Tionghoa. The Java ethnic group has the highest percentage, 30%, and the lowest percentage is Bali.

Based on domicile, Jakarta is divided into five regions: West Jakarta, South Jakarta, Central Jakarta, East Jakarta, and South Jakarta. Based on the survey results, most respondents live in the Central Jakarta area there were 34%, followed by South Jakarta 30% of respondents, East Jakarta 16% of respondents, West Jakarta 11% of respondents, and North Jakarta 9% of respondents. There are strong correlations between gender and occupation with *Bir Pletok* in the form of instant drinks, but the correlation is not in the same direction. There is a weak correlation between the domicile of the respondents and the level of education with *Bir Pletok* in the form of instant drinks. According to the assessment, respondents who prefer *Bir Pletok* with coffee (35%) and prefer to drink traditional drinks that are easy to consume (43%) comprised the highest percentage. Hence, the *Bir Pletok* was developed based on these results.

Sensory analysis results

Consumer acceptance of *Bir Pletok* coffee is based on the hedonic rating test results. There were no significant differences in overall liking between the five drink formulas, except for the color. However, Treatment 3 (T3) was selected and compared to the control for further analysis because it descriptively had the highest hedonic score, as seen in Figure 2. Color has a vital role in food or product acceptance. The results of the panelists' assessment of *Bir Pletok's* color can be seen in Figure 3.

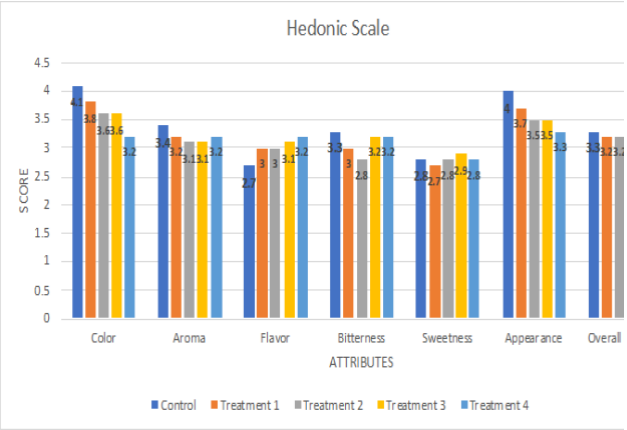

Figure 2. Hedonic Scale for *Bir Pletok*

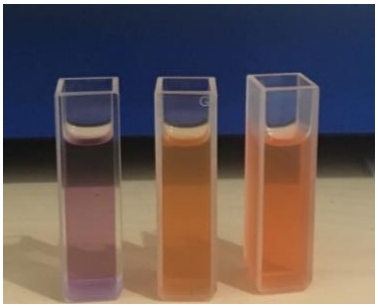

Figure 3. a) DPPH + Methanol;
b) DPPH+MeOH+Control; c) DPPH+MeOH+T3

Based on Figure 2, the average score given by panelists to the color of *Bir Pletok* obtained the highest score in treatment control, 4.1, and the lowest in Treatment 4 (T4). This fact shows that *Bir Pletok*, without additional coffee, can provide a natural color to drink. If there is too much coffee in *Bir Pletok*, the color will look less attractive. The result of one-way ANOVA shows significant differences between the two treatments.

In general, the color of a beverage or food product can affect consumers' attractiveness, and consumers generally prefer distinctive colors. The color produced from *Bir Pletok* with vanilla and coffee flavor was a reddish black by coffee and spices, especially *secang* wood—Brazilein compounds in *secang* wood produced yellow. When the compound is oxidized, it will produce a brownish-red color (Amin & Yuliana, 2016).

Moisture Content of Bir Pletok Coffee Drink

The sample was a control and selected treatment of T3. The results showed no significant difference in the moisture content of the control and T3, and the results followed regulations about herbs and spices (SNI 01-3709-1995) (BSN, 1995).

Antioxidant activity for Bir Pletok Coffee Drink

Spices have been known to contain bioactive components that can function as antioxidants. Table 3 shows significant differences between the control and T3 percentage inhibition. The results of T3 can be seen as higher than the control because of the coffee's polyphenol compounds, which contribute to its antioxidant activity.

Table 2. Antioxidant activity for *Bir Pletok*

Sample	Average of % Inhibition
Control	79 ± 1.3^{b}
Treatment 3	85 ± 1.6^{a}

The results of the antioxidant activity analysis show how much antioxidant compound content was still active and could reduce free radical compounds. Based on the measurement of the antioxidant activity of *Bir Pletok* drinks, the IC_{50} value of *Bir Pletok* was obtained from the calculation of linear regression equations. The results of IC_{50} can be seen in Table 4, which shows significant differences between Control and T3 ($p<0.05$), and both samples were said to have extremely high antioxidant activity because the IC_{50} value is less than 50 ppm.

Table 3. IC_{50} results for *Bir Pletok*

Sample	Average of IC_{50} (ppm)
Control	17.01 ± 0.71^{a}
Treatment 3	1.42 ± 0.50^{b}

IC_{50} is the solution concentration or sample that can reduce DPPH activity by 50%, or IC50 can be said to be a number that shows the concentration of extract (ppm), which can inhibit the oxidation process by 50%. The smaller the IC_{50} value, the higher the antioxidant activity. Specifically, a compound is said to have extremely high antioxidant activity if the IC50 value is less than 50 ppm (IC50 <50 ppm), moderate (100 < IC50 <150 ppm), and low (IC_{50}> 200 ppm) (Kedare & Singh, 2011).

The antioxidant activity of spice drinks (*secang* wood and ginger based) with oven drying method states that the antioxidant activity will decrease if the drying temperature is too high. The heating temperature is getting higher, resulting in secondary metabolites acting as antioxidants (flavonoids) becoming damaged. The study's results also state that the higher the drying temperature will lower antioxidant activity and can damage the antioxidant activity of the sample (Kusuma et al., 2019).

Total Plate Count

The total plate count results can be seen in Table 4. The calculation results show a large amount of bacterial growth. The value of the total plate count obtained is 1.5 x 10^4 and 1.4 x 10^4 CFU/g for control and T3, respectively. A large amount of bacterial growth is likely to be obtained from the storing process of *Bir Pletok*. Improper storing of *Bir Pletok* powder, which was not stored in the refrigerator and the container box, allows bacterial growth because of the increasing water activity and temperature (Sowmya & Deepika, 2013). The results of the Total Plate Count followed regulations about herbs and spices, which were below 1 x 10^6 CFU/g.

Table 4. Total plate count for *Bir Pletok*

Sample	Average of Total Plate Count (CFU/g)
Control	1.5×10^4
Treatment 3	1.4×10^4

Total Mold-Yeast

According to SNI 01-3709-1995 regulations regarding herbs and spices quality requirements, Total Yeast and Mold cannot exceed 10^4 CFU/g. The results of the observation are shown in Table 6. In the results of the calculations obtained during the study, samples of *Bir Pletok*: both the control and T3 show small numbers of yeast and mold (TFTC). The test results showed that the value of the Total Yeast and Mold of the dip bag *Bir Pletok* drink meets the Total Yeast and Mold requirements for herbs and spices, which is less than 10^4 CFU/g. This phenomenon happened because of the cleanliness of raw materials, especially while washing the ingredients. During the washing process, the raw material is washed clean so that the material taken from the soil, which is the habitat of mold and yeast can be eliminated, so the mold and yeasts are not produced in *Bir Pletok* drinks.

Table 5. Total Yeast-Mold for *Bir Pletok*

Sample	Total Number of Yeast and Mold (CFU/g)
Control	TFTC (Too Few To Count)
Treatment 3	TFTC (Too Few To Count)

pH Analysis

pH analysis was performed in the form of a dip bag of Bir Pletok powder that was dissolved in water. Table 7 shows that the pH of *Bir Pletok* drink ranges from pH 4.9 to 5.0. The more acidic the solution, the smaller the acidity or pH level. Besides that, pH is related to microbial viability; generally, the lower the pH, the longer the food shelf life because the decomposing microbes cannot grow. *Bir Pletok* has a red-brownish color produced from *secang* wood containing Brazilein compounds. pH conditions influence the stability of Brazilein pigments. Brazilein will form a brownish-red color to brown if exposed to sunlight. The pH conditions of Brazilein in the range of 2 – 4 are yellow, while at pH of 5 – 7 are red (Amin & Yuliana, 2016).

Table 7. pH value for *Bir Pletok*

Sample	pH value
Control	5.0 ± 0.71^a
Treatment 3	4.9 ± 0.50^b

4. CONCLUSION

Based on the current study's results, it can be concluded that the consumer selected the product development *Bir Pletok* with coffee-vanilla flavor and *Bir Pletok* in practical packaging. Based on sensory evaluation, no significant difference exists between the control and the sample with treatment, except for the color attribute. Based on the chemical test results, the selected *Bir Pletok* with treatment 3 (T3) (ginger 8.1%, vanilla 0.2%, and coffee 6.2%) has a higher percentage of DPPH inhibition and lower IC_{50} than the control. Each sample is said to have extremely high antioxidant activity because the IC_{50} value is less than 50 ppm. The total plate count and total yeast and mold were below 1 x 10^6 and 1 x 10^4 CFU/g, respectively, and the pH value was classified as acid. The moisture content of *Bir Pletok* coffee was 3.1±0.1 and 3.4±0.1 % for control and selected treatment, respectively, which has no significant difference and followed regulations about herbs and spices.

There is a chance of developing *Bir Pletok* dip bag drinks as traditional drinks. Some suggestions that can be submitted are processes to reduce the initial microbe load must be done. Further optimization of *Bir Pletok* coffee formulation should be done to improve consumers' acceptance level. Research needs to be done on suitable secondary packaging materials for *Bir Pletok* coffee drink products in dip bag packages. Shelf-life research needs to be done with several other parameters related to product characteristics. This research has been attempted and implemented following scientific procedure; however, it still has limitations in determining the

variables in this research. It is almost the same as what was done by previous researchers, without many opportunities to examine more closely. Antibiotic, antimicrobial, and formulation optimization are recommended to be done.

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