



## The effect of adding grass jelly leaf extract on PH, water holding capacity and colour of yogurt

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### Abstract

Fermented milk or yogurt are products that use biological processes to turn a liquid into a thick consistency. The water holding capacity of fermented milk can be enhanced using stabilizers. One stabilizer that can increase the water holding capacity of fermented milk is grass jelly leaf extract. The use of stabilizers affects the environment in which microorganisms grow. The objective of this study is to determine the effect of different concentrations of grass jelly extract on changes in pH, water holding capacity, and color. The parameters measured in this study are pH, water holding capacity, and color. Data analysis was conducted using a Randomized Complete Design with 3 treatments and 6 replications. Increasing the concentration of grass jelly extract caused the pH value to rise. The color test results showed that adding grass jelly extract did not change the color, but the water holding capacity decreased. Using grass jelly extract at up to 5% concentration is feasible for making yogurt.

**Keywords:** PH, water holding capacity

### Introduction

Fermented milk or yogurt are products that use biological processes. Fermentation is a method for transforming a substrate into a desired product with the help of microorganisms. Fermented milk products are usually consumed as drinks or foods with a liquid consistency that becomes thicker. This is evident from the different consistencies of fermented milk products available on the market, such as yogurt and Yakult.

Yogurt is a probiotic drink made from fermented milk that has a soft, consistent texture and a sour taste. The milk fermentation process is carried out by the bacteria *Lactobacillus bulgaricus* and *Streptococcus thermophilus* (Rachman, *et al.*). The consistency or viscosity of fermented milk can be enhanced using stabilizers. One stabilizer that can improve the consistency of fermented milk is grass jelly extract.

Green grass jelly is a type of functional food. Sensory-wise, grass jelly has a fresh green color due to chlorophyll and a soft texture, which makes it appealing for consumption. However, it often has a bland taste, so sugar and flavorings are commonly added. Nutritionally, green grass jelly contains bioactive components such as flavonoids, chlorophyll, alkaloids, terpenoids, phenolics, saponins, tannins, and ethanol, as well as minerals and vitamins including calcium, phosphorus, vitamin A, and vitamin B (Permanasari, 2016)<sup>[7]</sup>. According to Nurdin and Suharyono (2008), the main component of green grass jelly is polysaccharides, specifically pectin, which acts as a gelling agent and a good source of fiber. Tiara's research (2016)<sup>[9]</sup>, showed that adding grass jelly extract to fermented cow's milk can increase fiber content from 0.317% to 0.4009%.

Increasing the concentration of a stabilizer results in more complex bonds between polysaccharide components and water. This condition causes water, a component of fermented milk, to be bound within the polysaccharide structure. This affects consumer evaluation of viscosity, taste, color, aroma, and overall product preference. The use of stabilizers also influences the growth environment for microorganisms, which can alter bacterial activity and

change the final metabolites produced. This study aims to investigate the effects of different concentrations of grass jelly leaf extract on the production of fermented milk.

As the concentration of green grass jelly leaf extract added to yogurt increases, the content of pectin, which acts as a prebiotic, also increases. This generally results in a decrease in pH and sugar levels, while syneresis (the separation of liquid from the gel) and water content tend to increase. This is because green grass jelly extract contains pectin and bioactive components that act as antioxidants. The objective of this study is to determine the effect of different concentrations of grass jelly extract on changes in pH, water holding capacity, and color.

### Method

Fresh cow's milk is obtained from a dairy farm located in Tanjungsari, Sumedang, Indonesia. Black cuminoilisacquired from a herbal medicine store also located in Tanjungsari, Sumedang, Indonesia. The yogurt starter is obtained from Yogour met, a division of the Lallemand Group, based in Montreal, Canada.

### Preparation of Mother Starter Yogurt

The preparation of the starter yogurt involves dissolving 15% skim milk in 50 ml of water, followed by a pasteurization process at 80°C for 10 minutes. The milk is then cooled to a temperature of 43°C to 45°C and inoculated with 0.5% (0.25g) starter yogurt, after which it is incubated at 43°C for 6 hours (Frilanda, *et al.*, 2022)

### Making green grass jelly leaf extract (Nurur dan Siti, 2021)<sup>[6]</sup>.

The manufacture of grass jelly extract begins by washing fresh grass jelly leaves with clean water, then dried for ±24 hours at a temperature of ±50°C in the Cabinet dryer. Then the grass jelly leaves are ready dry crushed until it becomes powder. Grass jelly leaf powder is macerated with a ratio of ingredients and water and filtering is carried out for separate the extract and dregs.

**pH value**

The process of testing pH values is carried out using an electronic pH meter. Before calculating the pH value, preparation is needed before using the pH meter. This involves washing the tip of the cathode on the pH meter indicator with distilled water and then drying the cathode with a tissue. Next, the cleaned cathode tip is calibrated by immersing it in buffer solutions with pH values of 4 and 7 (Wahyudi, 2006) [11]. After calibration, the cathode tip is immersed in a 25 ml yogurt sample with the addition of grass jelly. The measurement results can be read on the pH meter.

**Color**

The color of the grass jelly yogurt sample was measured using a colorimeter (CHN Spec-Colorimeter CS-10) with an 8 mm aperture. Data were taken from three different parts of each treatment sample and then averaged. The measurement of the L\* value indicates the degree of lightness or darkness (L\* = 0 indicates perfect black, and L\* = 100 indicates perfect white); a\* indicates the degree of redness or greenness, and b\* indicates yellowness or blueness (Vital *et al.*, 2015) [10].

**Water Holding Capacity**

The Water Holding Capacity of grass jelly yogurt was measured according to Dai *et al.* (2016) [3]. A 4 g sample of grass jelly yogurt was centrifuged for 15 minutes at a speed of 4000 rpm. The clear supernatant was then separated by pouring it off and weighed. The weight of the yogurt gel was obtained by subtracting the weight of the supernatant from the initial sample weight. It was then calculated using the following formula:

$$WHC (\%) = 1 - \frac{\text{supernatant weight}}{\text{initial sample weight}}$$

**Results and Discussion**

**pH value**

Fermented milk is a product made using a fermentation process involving lactic acid bacteria. These bacteria transform the components of milk, resulting in the production of lactic acid as a metabolite. An increase in lactic acid concentration will alter the pH of the fermented milk. The pH values of the fermented milk with different concentrations of grass jelly extract are shown in Table 1.

**Table 1:** pH value of yogurt used concentration extract grass jelly different

Treatment	pH
1%	3.62 <sup>a</sup>
3%	3.63 <sup>a</sup>
5%	3.97 <sup>b</sup>

Table 1 shows that the concentration of grass jelly extract has a significant effect on the pH of fermented milk at a 5% concentration. This is because gelatin primarily functions as a stabilizer, and thus does not affect pH changes. This finding is consistent with research on yogurt production, where Afrianto and Liviawati (1993) [1], noted that gelatin's main functions are as a stabilizer, thickener, emulsifier, and gelling agent. Its role in stabilizing the mixture can inhibit bacterial mobility, which may reduce the activity of yogurt

cultures and consequently lower the production of lactic acid (H<sup>+</sup> ions) (Alakali *et al.*, 2008) [2].

**Color**

The color measurement test results include L\* for lightness, and a\* and b\* for the green-red and blue-yellow components, respectively. The color of yogurt with added green grass jelly leaf extract is shown in Table 2.

**Table 2:** Yogurt colors used concentration extract grass jelly different

Treatment	L*	A*	B*
1%	78.70 <sup>a</sup>	-3.82 <sup>a</sup>	12.27 <sup>a</sup>
3%	72.96 <sup>b</sup>	-5.07 <sup>b</sup>	16.07 <sup>b</sup>
5%	63.51 <sup>c</sup>	-5.86 <sup>c</sup>	17.10 <sup>b</sup>

The results of observations on the use of grass jelly leaf extract in making yogurt with increasing concentration of grass jelly extract, the brightness decreases, which can be seen in the decreasing L value. This is because the color of grass jelly leaves is dark green, so with the added concentration of grass jelly leaves, the darker the color of the yogurt produced. The A value is increasingly negative, which means the color of the yogurt is getting greener, this is in accordance with the color of grass jelly extract which is getting greener with increasing concentration of grass jelly in the treatment. The B value shows an increase, which means it is getting yellower, this is in accordance with the color of the yogurt which tends to be yellowish white.

**Water Holding Capacity**

The water holding capacity value of the yogurt used concentration extract different grass jelly seen in Table 3.

**Table 3**

Treatment	Water holding capacity (%)
1%	81.71 <sup>a</sup>
3%	84.59 <sup>b</sup>
5%	86.59 <sup>c</sup>

Connection between use pectin in extract leaf grass jelly with WHC showing that with increasing percentage added pectin WHC value of the yoghurt produced was increasing. Efforts to prevent happen decline water holding capacity done with method addition material soluble thickener in water one of them that is pectin. That matter in accordance with opinion of Dewi *et al.* (2019) [4], stated that addition material stabilizer form hydrocolloid can prevent happen decline water holding capacity and syneresis. Decline water holding capacity caused there is a yoghurt fermentation process because activity bacteria sour lactate which produces total acid tall so that cause decrease in pH and water holding capacity as well surface experience syneresis.

**Conclusion**

Addition extract leaf grass jelly Greens in making yoghurt have an effect to water holding capacity, will but No influential on pH and color. Addition extract leaf grass jelly Green at a concentration of 5% produces the best yoghurt with water holding capacity (86.59%), pH (3.9), L\* (78.70), A\*(-3.82), B\* (12.27).

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