Optimization of Yogurt Fermented Milk Products with The Addition of Natural Stabilizer Based on Local Potential of Taro Starch (*Colocasia esculenta*)

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Abstract—The aims of research were to improve the quality of the final product through the use of yogurt stabilizer based on local potential, easily obtainable stock and has a low price, namely taro starch (*Colocasia esculenta*). The method of research was laboratory experiment arranged in completely randomized design factorial. The first factor is the level of taro starch with 4 treatments (0%, 1%, 2%, 3%). The second factor is the concentration of starter with 3 treatments (1%, 3%, 5%). Each treatment was repeated 3 times. The variables measured and analyzed: 1) pH, 2) the acidity, 3) viscosity. The data were analyzed by Anova. If significant the Duncan's Multiple Range Test was applied.The results showed the addition of stabilizer level provides a significant influence on the pH, acidity and viscosity of yogurt (P <0.01) but concentration starter not significant of pH and viscosity (P> 0.05) but very real effect on the acidity of the yogurt (P <0.01). Interaction taro starch level and inoculation starter does not give effect to the quality of the yogurt based on physico-chemical properties. pH yogurt with the addition of stabilizer level of 1%, 2% and 3% produce ideal pH after fermentation for ready consumption of 3.9. The acidity of the yogurt without stabilizer (0%) was 1,52% -2.02%. Addition of stabilizers 1% and above decreased the acidity of the yogurt. Level 3% of stabilizer provides the highest viscosity value of 27620 cP yogurt. While the lowest viscosity of the yogurt without addition of stabilizer (0%) of 840 Cp. Conclusions of research that the stabilizer taro starch level of 1% contribute to produce optimal quality yogurt products.

Key words—stabilizer, fermented milk, physco-chemical

INTRODUCTION

The increasing public awareness of healthy living, the consumer demand for food is also increasingly shifts. Foodstuffs are now beginning to demand not only having a good nutritional composition and the appearance and taste of interest, but also must have certain physiological functions for the body. This phenomenon gave birth to the concept of functional food (food for specified health Use). Fermented milk yogurt is one of the functional food ingredient products as it can act as an antioxidant also claimed to have antitumor activity by exploiting the activity of lactic acid bacteria (LAB) [1]. Weakness yogurt product that is in the process of making a decline in water holding capacity (whey off), so as to result in a decrease in viscosity / viscosity [2]. The decline in water holding capacity can affect the quality of the final product yogurt. Alternatives to anticipate this problem by adding a stabilizer [3] that could serve to increase the viscosity of yogurt [4].

Stabilizer both natural and artificial, are widely used in the food industry. The stabilizer is used commercially include: gelatin, pectin, sodium alginate and various types of gum and CMC and keragenan. [5] reported that the taro starch (Colocasia esculenta) as one of the local potential that can be developed to be an alternative source of stabilizer industry in Indonesia. So far there has been no study related to the utilization of the local potential of taro starch to improve the quality of yogurt is based on physico-chemical properties. Thus the necessary research on testing the addition of taro starch as a stabilizer to fix the problems in the process of making yogurt products so that later can produce a final product that best yogurt.

MATERIALS AND METHODS

a. Taro starch

A necessary ingredient in the form of taro are of good quality. Taro peeled and washed and cut and soaked in saline solution 7.5% with a ratio of 4: 1 (saline: taro) for 1 hour with the aim to eliminate the oxalate compound. Taro chunks of crushed and extracted with a ratio of 4: 1 (water: taro). Then the material is squeezed using a filter cloth. Dregs taro plus water at a ratio of 4: 1 (water: pulp taro) and then extracted back. Milk starch deposited for 6 hours - 8 hours. Starch that has been formed is dried at a temperature of ± 60 ° C for ± 6 hours, then ground and sifted with a 100 mesh sieve [6]

b. Yogurt

Stages of making yogurt includes pasteurized cow's milk with a temperature of 90 ° C for 10 minutes with the addition of starch taro. Decrease the temperature quickly done to a temperature of 43°C with a glass beaker containing milk immersion into cold water. The next stage of the addition of inoculation of bacteria starter. After the inoculation process is completed followed by yogurt fermentation anaerobic incubation for 24 hours at room temperature. After completion of the incubation period. Then analyzed the quality of yoghurt.

c. Quality yogurt

Measuring the quality of yogurt made with analysis of physico-chemical properties. Determination of pH and acidity based testing tertitrasi acid [6]. Analysis of pH by using a pH meter calibrated pH meter by inserting electrodes into the buffer solution with pH 7 and pH 4. Testing tertitrasi acidity by using 0.1% NaOH solution until the color changes to pink. Measurement of viscosity using relative viscosity.

d. The method of research

The method of research was laboratory experiment arranged in completely randomized design factorial. The first factor is the level of taro starch with 4 treatments (0%, 1%, 2%, 3%). The second factor is the concentration of starter with 3 treatments (1%, 3%, 5%). Each treatment was repeated 3 times. The variables measured and analyzed: 1) pH, 2) the acidity, 3) viscosity.

e. Data analysis

The data were analyzed by Anova. If significant the Duncan's Multiple Range Test was applied.

RESULTS and DISCUSSION

a. Taro starch

Laboratory test results related to the identification of the nutritional content of the taro starch can be seen in Table 1.

Table 1. Nutritional value of taro starch

No.	Nutrient	(%)
1	Dry matter	83,81
2	Ash*	0,34
3	Crude Protein	0,08
4	Crude Fiber	0,41
5	Crude Fat	0,31

*) Based on a 100% dry matter

b. Effect of Taro Starch and Inoculation Starter on pH Yogurt

Based on the analysis of variance showed that the use stabilizer of taro starch give a significant influence on the

ISBN: 978-602-60569-5-5

pH of yogurt (P <0.01). Inoculation starter made no distinction of pH yogurt ((P> 0.05). The pH value of the lowest-level yogurt without the addition of stabilizer (0%) amounted to 3.71, while the highest pH on yogurt products contained in taro starch treatment level of 2% (P2) of 3.98. Level taro starch 1%, 2% and 3% no distinction of pH yogurt (P> 0.01). The use of taro starch stabilizer achieving the ideal pH near the pH yogurt after fermentation when it is ready for consumption namely pH 4 [7].

Table 2. Effect of Taro Starch and Starter on pH Yogurt

Treatment Taro starch	Starter	pH
0%	1%	3,71[a]
	3%	3,74[a]
	5%	3,73[a]
1%	1%	3,96[b]
	3%	3,95[b]
	5%	3,94[b]
2%	1%	3,93[b]
	3%	3,98[b]
	5%	3,97[b]
3%	1%	3,93[b]
	3%	3,92[b]
	5%	3,95[b]

Note: a-b indicated highly significant different effect (P<0.01)

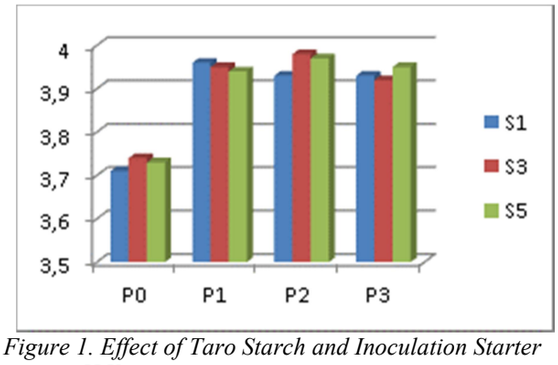

Figure 1. Effect of Taro Starch and Inoculation Starter on pH Yogurt

c. Effect of Taro Starch and Inoculation Starter on Total Acidity Yogurt

Table 4. The acidity of the yogurt without addition of starch by 1.52% -2.02%. Based on the analysis of variance showed that the use of taro starch stabilizer with level of 1%, 2% and 3% did not give the difference to the value of the acidity of the yogurt (P> 0.01). There is no interaction between the levels of starch taro and inoculation starter to the total acidity of yogurt (P> 0.01). Level of taro starch 0% with starter inoculation 5% had the highest total acid as 2.02%.

Table 3. Effect of Taro Starch and Inoculation Starter on Total Acidity Yogurt

Treatment Taro starch	Starter	Total Acidity (%)
P0	S1	1,52[b]
	S3	1,73[c]
	S5	2,02[d]
P1	S1	1,4[a]
	S3	1,6[b]
	S5	1,8[c]
P2	S1	1,26[a]
	S3	1,35[a]
	S5	1,59[b]
P3	S1	1,14[a]
	S3	1,39[a]
	S5	1,52[b]

Note: a-d indicated highly significant different effect (P<0.01)

While the lowest acidity level taro starch 3% and concentration starter 1%. The higher the level of use of taro starch (2% and 3%) decrease acid production yogurt. This synergy with the research results [2] by using carboxyl methyl cellulose (CMC) 0.50% -1% acidity yogurt produces a value of 0.90% -0.91%, lower than without stabilizer with a value of 0.92% acidity. Furthermore, preliminary studies with a concentration of 0.3% CMC increase the acidity of the yogurt but the value of whey separation occurs. Therefore, the low acid production could be attributed to its formation of highly viscous systems roomates that the caused diffusion resistance reduced mobility of reactants; and the consequence was reduction of the rate at the which the reacting species (yoghurt culture organisms and lactose) came together for fermentation to take place.

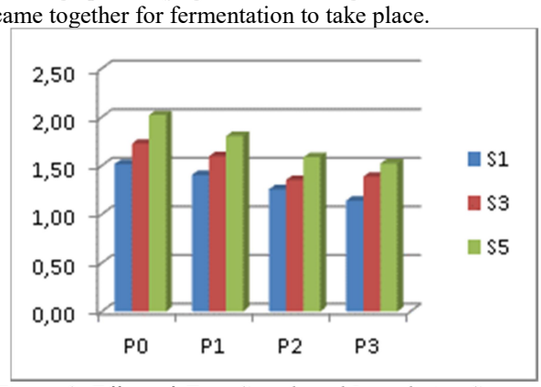

Figure 2. Effect of Taro Starch and Inoculation Starter on Total Acidity Yogurt

d. Effect of Taro Starch and Inoculation Starter on Viscosity Yogurt

Based on the analysis of variance showed that the use of taro starch stabilizer give a significant influence on the viscosity of yogurt (P <0.01). Inoculation starter made no distinction on the viscosity of yogurt (P> 0.05). Level 3% starch taro provides the highest viscosity value of 27620 cP yogurt. While the lowest viscosity of the yogurt without addition of starch taro (0%) 840 cP. The use of taro starch stabilizer increases the viscosity of yogurt. Synergies research [8] with stabilizer of xanthan and carrageenan gum increase viscosity yogurt.

Table 4. Effect of Taro Starch and Inoculation Starter on Viscosity Yogurt

Treatment Taro starch	Starter	Viskositas (cP)
P0	S1	870[a]
	S3	840[a]
	S5	910[a]
P1	S1	1370[b]
	S3	2930[b]
	S5	2260[b]
P2	S1	16770[c]
	S3	18180[c]
	S5	18020[c]
P3	S1	27620[d]
	S3	23560[d]
	S5	25530[d]

Note: a-d indicated highly significant different effect (P<0.01)

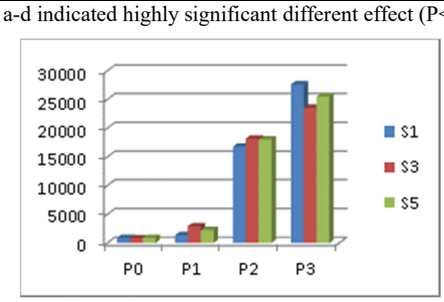

Figure 3. Effect of Taro Starch and Inoculation Starter on Viscosity Yogurt

CONCLUSION

The conclusion from this research is the addition of taro at 1% contributed to the quality yogurt products are optimal in terms of physico chemical properties.

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