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Effects of Addition Chili Ground to The Characteristics of Bekasam from Cork Fish (Channa striata) During Fermentation

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Abstract

Bekasam is a fermented fish product made from fish, salt, and roasted rice or rice that is mixed and fermented for 7 days. This study aims to determine the effect of the addition of ground chili at different concentrations on total acid, pH value, total lactic acid bacteria, and sensory properties of cork fish bekasam. The research design used was completely randomized design, 3 treatments and 3 replications. The treatments given were IBG without the addition of ground chili, IBGC1 adding 10% ground chili and IBGC2 adding 20% ground chili. Data were collected for total acid, pH, and total lactic acid bacteria fermentation days 1, 3, 5, and 7. The sensory properties were observed on days 1 and 7. The results showed that the addition of ground chili can reduce pH during 7 days fermentation, but the increase in total acid was not significant. The addition of 10% ground chili has a positive effect on the growth of lactic acid bacteria. The addition of 20% ground chili showed an inhibition of the growth of lactic acid bacteria during fermentation. Sensory test results stated that panelists preferred bekasam with the addition of 10% ground chili compared to control brakes and the addition of 20% ground chili.

Keywords: bekasam, ground chili, pH, total-acid, LAB, organoleptic

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INTRODUCTION

Fermentation is one of the methods of fish processing that has been passed down. This was chosen because the process is simple, inexpensive, produces distinctive flavors, and extends shelf life. Several types of fish fermentation products known to the public include shrimp paste (Sharif et al., 2008), wadi (Khairina et al., 1999; Khairina & Khotimah, 2006; Petrus et al., 2013), peda (Thariq et al., 2014), ronto (Khairina et al., 2013), and bekasam (Candra et al., 2007; Lestari et al., 2018; Nurnaafi et al., 2015; and Rinto et al., 2015).

Bekasam is one of the most popular fermented fish products in Kalimantan. Bekasam has advantages including simple processing, inexpensive, high nutritional value, and distinctive flavor. The manufacturing process requires 7 days of fermentation (Suyatno et al., 2015). Bekasam has 25% higher protein content than fresh fish. During fermentation there will be a decrease in pH so that it will inhibit the growth of spoilage bacteria (Novianti, 2013). Bekasam fermentation involves the activity of lactic acid bacteria. The activity of lactic acid bacteria results in changes in taste and aroma of the product to become acidic followed by a decrease in pH (Candra,

2006). Bekasam has the potential as a functional food because it contains antibacterial and anticholesterol compounds. Lovastatin contained in the bekasam has the ability to reduce cholesterol (Lestari et al., 2018). On the other hand, bekasam still have weaknesses including qualities that are difficult to control. This is due to the spontaneous fermentation process and the monotonous taste of the product. Therefore, innovation is needed to improve the taste of bekasam. One way to improve the taste of bekasam is by adding spices.

Previous research had added garlic to bekasam. In addition spices such as chili have been used in fermented products such as kimchi which can decrease pH, increase total acidity, and improve taste (Jeong et al., 2011). The addition of chili in bekasam has never been done. Therefore this study aims to determine the changes in pH, total acid, total LAB, and sensory properties of bekasam formulated with chili.

RESEARCH METHOD

Materials and Equipment

The main ingredients used in this study were cork fish, chili, salt, and roasted rice. Chemicals for analysis using pro Analysis. The equipment used is an old fermentation container. Analysis equipment using pH meters (Milwaukee), glassware, colony counters, incubators, sensory testing equipment.

Research Design

The experimental design used was a Completely Randomized Design (CRD). The treatments given were control without the addition of ground chili (IBG), granting 10% ground chili (IBGC1), and granting 20% ground chili (IBGC2). Each treatment was repeated three times.

Chili Preparation

Ground chili is made according to Berlian et al. (2016). Chili seeds are separated, then washed, drained, then blended with the addition of water as much as 10%. Finely ground chili will be used in the formulation.

Roasted Rice Preparation

Rice is washed, drained, then roasted over medium heat until brownish yellow. After a cold blender until the rice breaks. Then it is used in formulations.

Table 1. Formulation of Bekasam

Material	Weight (g)		
	IBG	IBGC1	IBGC2
Cork fish (I)	1600	1600	1600
Roasted rice (B)	240	240	240
Salt (G)	160	160	160
Chili ground (C)	0	160	320

I = cork fish, B = roasted rice, G = salt, C = ground chili. IBG = cork fish + 10% salt + 15% roasted rice. IBGC1 = cork fish + 10% salt + 15% roasted rice + 10% ground chili. IBGC2 = cork fish + 10% salt + 15% roasted rice + 20% ground chili.

Bekasam Preparation

Making bekasam refers to Mumtianah et al. (2014) and Berlian et al. (2016). The cork fish is weeded and then washed with running water and drained. The fish is placed in a plastic jar then salt is added 10% w/w and ground chili according to the treatment. let sample for 12 hours. Then added 15% w/w roasted rice. After that it is

fermented for 7 days. Each jar contains a mixture of about 600 grams of fish, salt, roasted rice, and ground chili. The bekasam formulation is presented in Table 1.

Determination of pH

The pH test begins with a calibration of the pH meter using a buffer of pH 4 and 7. Furthermore, measurements are made on the sample solution that has been homogenized with distilled water. Dip the electrode on the pH meter into the sample solution and allow a few moments to obtain a stable scale reading.

Determination of Total Acidity (Aristya et al., 2013)

A total of 100 grams of sample was crushed with mortar. Then 10 grams of crushed sample is put into a 100 mL volumetric flask, adding distilled water to the boundary markers then homogenized. Then filtered with Whatman 42 paper. The filtrate is taken 25 mL and put into a 50 mL erlenmeyer. Three drops of phenolphthalein indicator was added. Titrated with 0.1 N NaOH solution to form pink.

Determination of Lactic Acid Bacteria (LAB) (Fardiaz, 1993)

NaCl 0.085% diluent solution is made by weighing 0.85 grams of NaCl, then dissolve distilled water in 1000 measuring flasks and homogenized. Erlenmeyer is filled with 45 mL of diluent solution used for 10-1 dilution. The test tube was filled with 9 mL of diluent solution used for 10-2 dilution and so on. The weighing of MRS broth (Merck) media is 52.2 grams. Then put it into the erlenmeyer and add bacto to as much as 1.5% and add CaCO3 as much as 1% dissolved with 1000 mL of distilled water. Erlenmeyer is covered with cotton and wrapped in aluminum foil. Sterilize at 121 ° C for 15 minutes. Media will be used in the next process. A sample of 100 grams was mashed aseptically in a mortar. then taken as much as 5 grams of sample and put in a 45 mL diluent solution that has been prepared previously. Getting a 10-1 dilution, a 5 gram sample weighed was put into an erlenmeyer containing 45 mL of diluent solution. Dilutions 10-2 to 10-5 are made sequentially by adding 1 mL to the diluent solution as a dilution series. Pipette 1 mL from each dilution of 10-1, 10-2, and so on enter into a sterile petri dish. MRS agar (Merck) media was poured into a 15 mL petri dish. Petri dishes are rotated clockwise until the media and sample are evenly mixed and allow to harden. After the agar becomes solid, the petri dish is then incubated in an incubator at 37 ° C for 24 hours in an upside down position. Colonies are counted on petri dishes which have 30 to 300 colonies.

Sensory Analysis (Setyaningsih et al., 2010)

The sensory test used is the hedonic test with a score of 1-5 (very dislike to very like). The test used 30 untrained panellists from Mulawarman University. Attributes observed include color, aroma, taste, and texture.

Data Analysis

The research data were analyzed by diversity test using SPSS V20.

RESULTS AND DISCUSSION

pH Value

The first day fermentation showed the pH value in the IBG treatment was 5.91, IBGC1 was 5.73, and IBGC2 was 5.54. The third day fermentation showed the pH value at the IGB treatment was 6.58, followed by IBGC1 at 6.14, and IBGC2 at 6.45 (Figure 1). The results of the analysis of the diversity of pH values on the 1st and 3rd day fermentation had a very significant effect but the 5th and 7th day fermentation had no significant effect.

The pH value falls due to the formation of lactic acid, lactic acid is formed due to the activity of lactic acid bacteria. Giving ground chili turned out to inhibit pH reduction until the 5th day. This phenomenon is suspected that chili has inhibitory properties against the growth of lactic acid bacteria. The pH range of bekasam cork fish (Nurani et al., 2014) and saluang fish (Lestari et al., 2018) without chili during 7 days fermentation were 5.57-5.51 and 5.89-6.02. Whereas the pH of bekasam parrot fish with the addition of garlic is in the range of 4.75 - 4.85 (Widayanti et al., 2015).

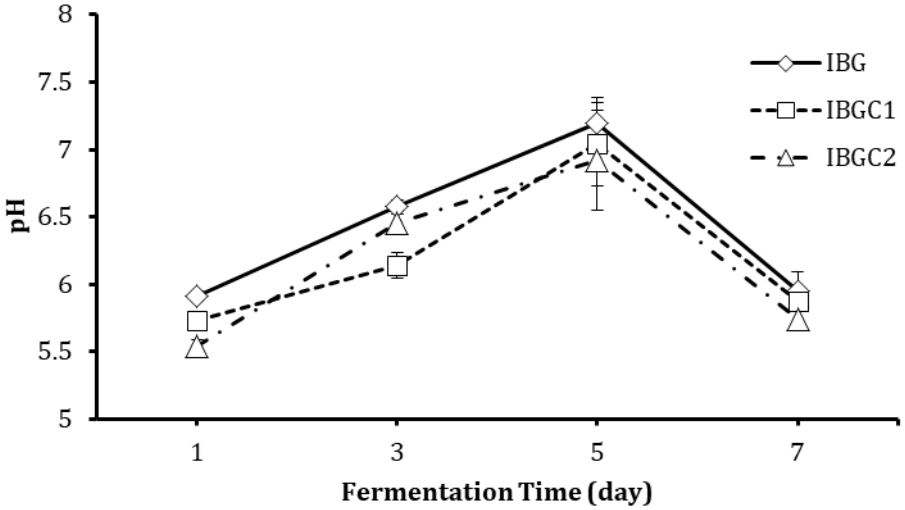

Figure 1. Changes in pH of Bekasam during Fermentation

Total Acidity

The first day fermentation showed the total acid value in the IBG treatment was 0.10%, IBGC1 was 0.11%, and IBGC2 was 0.14%. The 5th day fermentation showed the highest total acid value in the IGB treatment was 0.26%, followed by IBGC1 at 0.19% and the lowest IBGC2 at 0.13% (Figure 2). The results of the analysis of the diversity of the total acid values on the first day of fermentation had a significant effect but the fermentation of the 3rd, 5th and 7th days had no significant effect.

The increase in acid levels in bekasam cork fish in this study is thought to be caused by the activity of lactic acid bacteria that grow during fermentation. The production of lactic acid produced by cork fish bekasam is lower when compared to the total acid bekasam from red value fish which is 1.33% (Widayanti et al., 2015).

Total Lactic Acid Bacteria (LAB)

The highest total lactic acid bacteria (LAB) in the IBG treatment occurred on the 5th day fermentation, IBGC1 treatment on the 3rd day fermentation and IBGC2 treatment on the 1st day fermentation (Figure 3). The results of the analysis of the total diversity of LAB bekasam cork fish with variations in the concentration of ground chili on the 1st and 7th day fermentation had a significant effect but the 3rd and 5th day fermentation had no significant effect.

Provision of 10% ground chili causes a total increase in BAL on the 3rd day which indicates no inhibitory effect on the growth of BAL. This corresponds to the IBGC1 bekasam pH value which showed the lowest at the 3rd day observation. This is presumably due to the activity of lactic acid bacteria that produce lactic acid.

On the other hand, the addition of 20% ground chili turned out to inhibit the growth of lactic acid bacteria which is characterized by a decrease in the number of LAB during 7 days fermentation, ie log 6.52 on the first day to log 5.69 on the 7th day. Inhibition is thought to occur because the active compound found in chili is capsaicin. Capsaicin concentrations at certain levels can inhibit the growth of microbes because capsaicin acts as a bactericide and fungicide. According to Suyatno et al. (2015), total lactic acid bacteria in cork fermentation was in the log range of 6.26 CFU / g and this condition was almost the same as the condition of cork fish bekasam with the addition of 10% ground chili. Other studies have also succeeded in isolation and identification of lactic acid bacteria from bekasam of cork fish, tilapia, sepat fish (Novianti, 2013) and milkfish fish (Chandra et al., 2007).

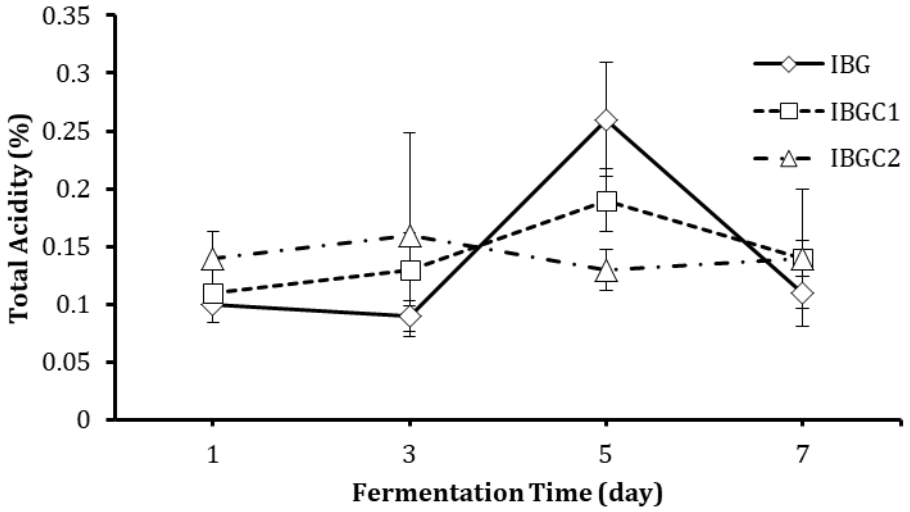

Figure 2. Total Acidity of Bekasam during Fermentation

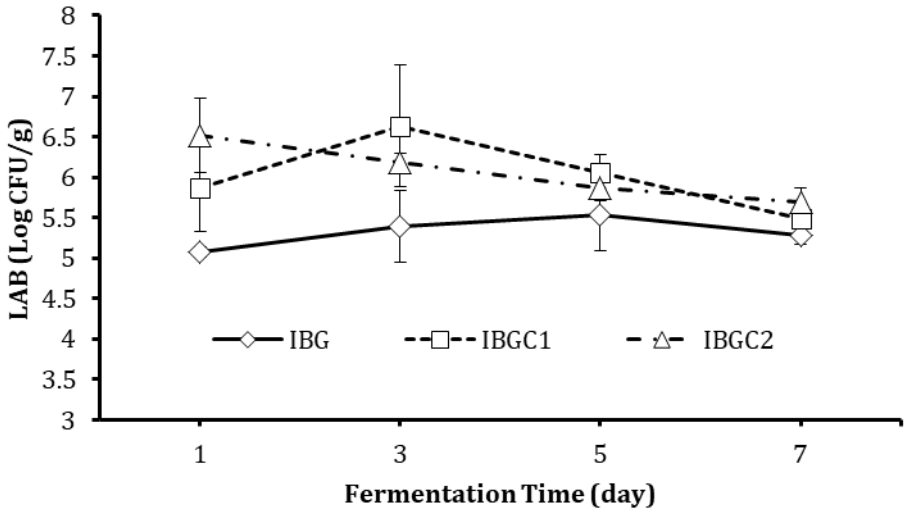

Figure 3. Total Lactic Acid Bacteria for Bekasam during Fermentation

Taste Sensory

The first day of fermentation has almost the same taste preference value for all three samples. After fermentation lasted 7 days, the highest value of taste preference in the treatment of IBGC2 (like), while the lowest in the treatment of IBG (usual). The difference in taste preferences tends to be caused by the spicy flavor that is raised by the ground chili although it has not been able to give a stronger taste sensation towards very like. Statistically shows that variations in grinded chili peppers with different concentrations do not affect the taste of bekasam fish cork (Figure 4). The taste of bekasam is generally a mixture of salty, sour, and savory derived from salt, organic acids produced by fermentative bacteria, and amino acids due to decomposition of fish meat protein. During the process of fermentation of amino acids will increase due to the breakdown of proteins into amino acids and will affect the taste (Hadiwiyoto, 1993).

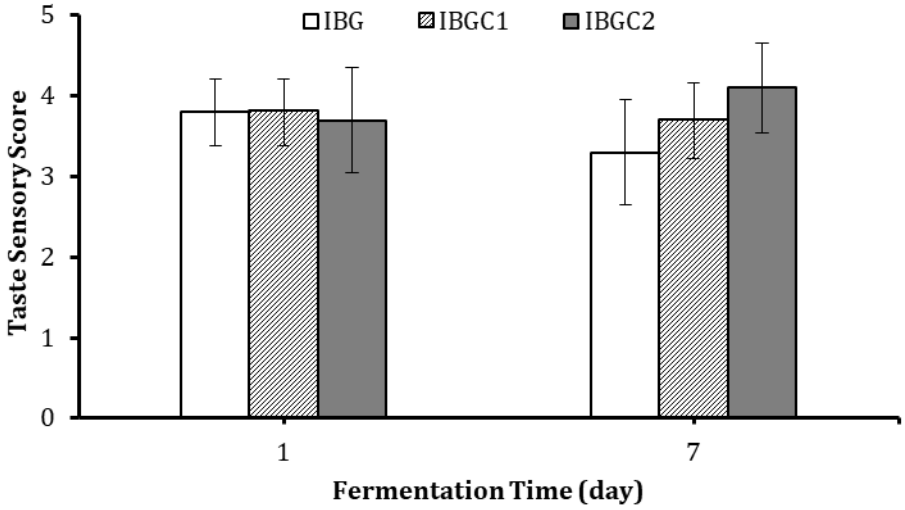

Figure 4. Taste Sensory Score of Bekasam during Fermentation

Color Sensory

Observations on days 1 and 7 showed that there were differences in color preference between the IBG, IBGC1, and IBGC2 treatments. In general, the range of preference for bekasam colors is normal and likes. The IBGC2 treatment showed the highest color preference. The results of the statistical analysis showed that the preference for bekasam colors on observations of days 1 and 7 for the IBG and IBGC1 treatments were not significantly different. Whereas the IBG and IBGC2 treatments show that between treatments are significantly different. This shows that the more ground chili that is used will affect the color preference for bekasam (Figure 5). Differences in color preferences may be related to the content of dyes in chili (Rizal & Anies, 1994). The greater addition of chili will cause the panelists to like the sample more because the red color of the chili is a strong attraction (Widayanti et al., 2015).

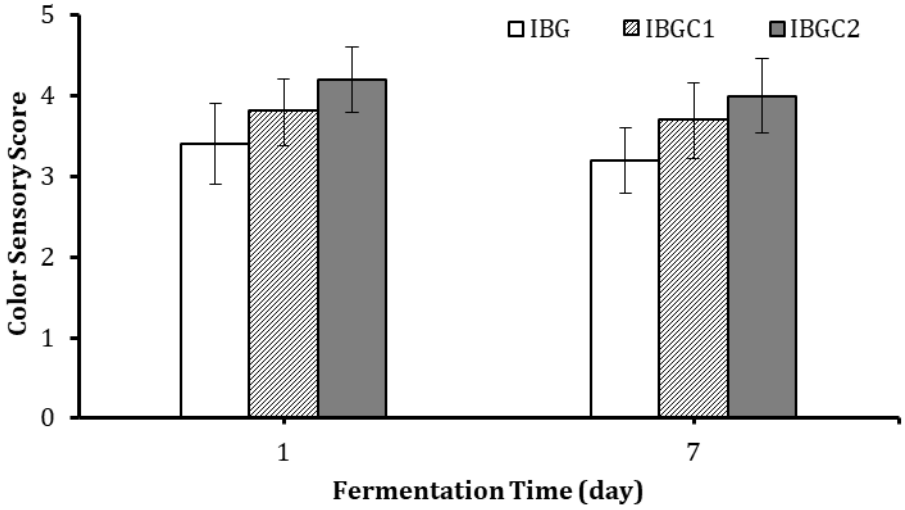

Figure 5. Color Sensory Score of Bekasam during Fermentation

Aroma Sensory

The first day fermentation showed a similar aroma value for the IBG and IBGC2 (like) treatments, whereas the IBGC1 (ordinary) treatments. After 7 days fermentation, there was a change in aroma preference in each treatment. The IBGC1 treatment showed the highest aroma value of 4 (likes) (Figure 6). The results of statistical analysis showed that variations in the concentration of ground chili did not cause a significant difference in the taste of scent on the 1st and 7th day. The fondness of the scent produced by bekasam in this study is almost the same, which is in the range of likes (Widayanti et al., 2015). The addition of ground chilli affects the aroma of bekasam. This is possible because of the oleoresin in chili which causes a spicy taste, red color and distinctive flavor (Furia, 1968).

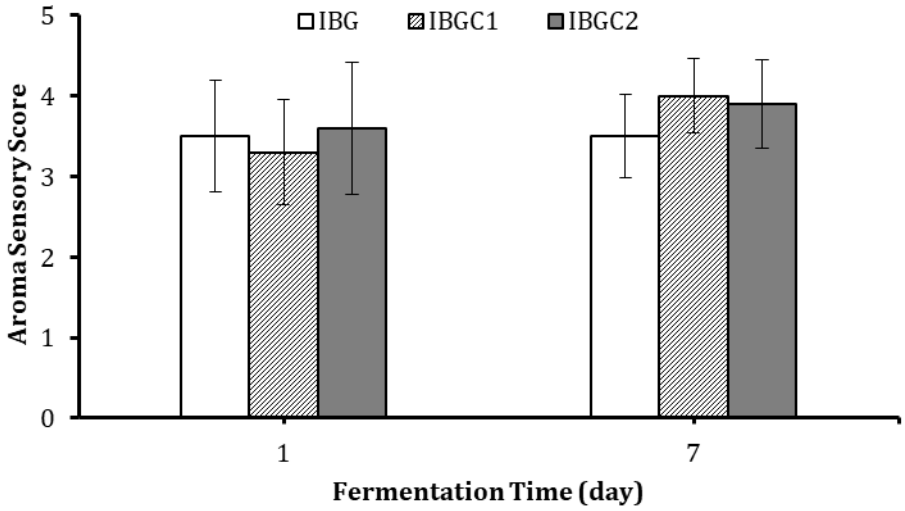

Figure 6. Aroma Sensory Score of Bekasam during Fermentation

Textur Sensory

The first day fermentation gives the same texture preference value for all treatments. After 7 days of fermentation, there was a change in texture preference in the IBGC1 and IBGC2 treatments, which was very like. The results of the statistical analysis showed that the variation of grinded chili did not cause any significant difference to the preference for the texture of bekasam on days 1 and 7 (Figure 7). The texture produced by bekasam in this study is similar to Widayanti et al. (2015). The formation of the texture is influenced by the salt added. Salt will be associated with protein to form a chewy texture (Cheng et al., 2014).

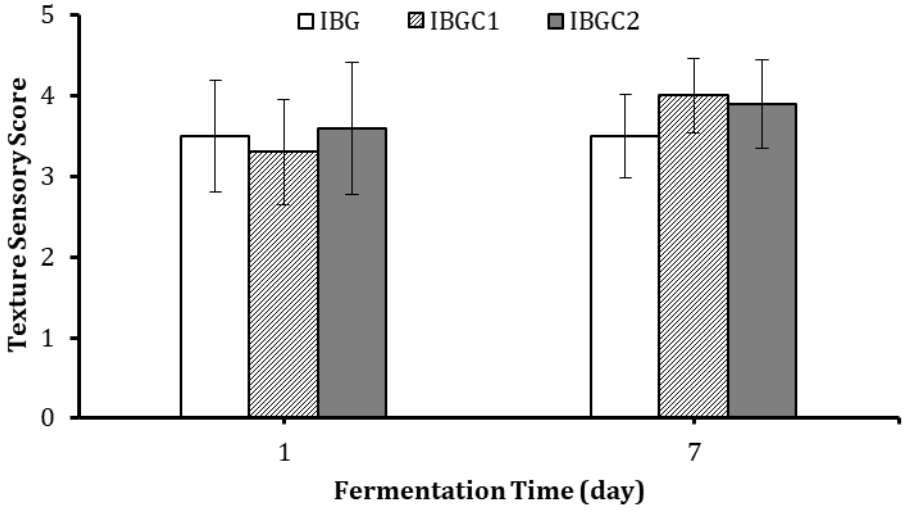

Figure 7. Texture Sensory Score of Bekasam during Fermentation

CONCLUSION

The addition of ground chili can inhibit the decrease in pH bekasam during 7-day fermentation. Total acid with the addition of 10% and 20% ground chili has decreased during fermentation, while the addition of 20% ground chili inhibits the growth of lactic acid bacteria. The addition of 10% ground chili has a positive effect on the growth of lactic acid bacteria due to an increase in total bacteria during fermentation. Sensory test results showed that panelists preferred bekasam cork fish with the addition of 10% ground chili.

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