Journal of Livestock Science and Production
p-ISSN 2598-2915
e-ISSN 2598-2907
Volume 4 No. 1
March 2020

The Effect Probiotic Lactic Acid-Based on Organoleptic Indicators of Brown Rice Polish

Pradipta Bayuaji Pramono[1*)], Mohamad Haris Septian[1], Mikael Sihite[1]
[1)] Department of Animal Science, Faculty of Agriculture, Universitas Tidar

*) Corresponding author
E-mail: p.bayuaji.p@untidar.ac.id

Abstract

This study aims to determine the effect of adding probiotics based on lactic acid bacteria (BAL) on brown rice polish fermentation, which was tested organoleptically. The variables observed were texture, colour, scent, flavor, and assessment of the quality of one month fermented brown rice polish. Sources of probiotics used are commercial probiotics based on lactic acid bacteria (LAB). The treatments given were P0 = Rice polish fermentation without the addition of probiotics (control), P1 = Rice polish fermentation + 0.5% probiotic, P2 = Rice polish fermentation + 1.0% probiotic, P3 = Rice polish fermentation + 1.5% probiotic. The data obtained were processed using variance analysis of a randomized complete design (RCD). If there were significant differences, the data was further tested using Duncan's Multiple Range Test (DMRT). The results showed that the addition of probiotics at a dose (0.5; 1.0; 1.5)% improved the flavor and quality assessment of the fermented brown rice polish but did not affect the texture, colour, and scent of fermented brown rice polish. It can be concluded that the addition of LAB-based probiotics can improve the quality of brown rice polish, which is assessed organoleptically.
Keywords: Brown rice polish, Fermentation, Organoleptic, Probiotic

Introduction

The success in raising livestock is influenced by feed. The feed that is consumed will supply nutrients requirements of maintenance and production. Ironically, the main problem in raising livestock in Indonesia is limited feed. The availability of conventional feed originating from cultivation and nature is limited because the land it provides is converted into agricultural and industrial land.

The utilization of non-conventional feed sources is an effort to substitute the reduced need for conventional feed. Generally, the non-conventional feed comes from agricultural by-products, including brown rice polish. So far, rice bran and rice polish are commonly used as additional feed for ruminants and staple feed for poultry, but what is commonly used as feed is white rice bran and white rice polish.

The by-product of rice processing, which is a commonly used feed ingredient, is polish, which is the by-product of rice processing plants, especially the honing part. Polish is a rice grain membrane, or thin skin covering the grains including a small portion of starchy endosperm. The name rice polish refers to everything that belongs to the type of rice, including red rice. According to Chen et al. (2012). The rice milled (milling process) proportion is 70%

rice, 20% husk, and 8-10% polish. Rice is the main product, while husk and polish are by-products. Tuarita (2017) states that the type of rice used and the milling process rate affect the proportion of the rice mill's yield. Nowadays, rice polish has been widely used for animal feed as food raw material and raw material for making cosmetics. Rice polish is widely available in Dukun District, Magelang Regency. This is due to a particular rice milling industry for red rice in Dukun Village, Dukun District, Magelang Regency.

Polish is less durable and easy to damage; this is because the polish has a high-fat content. This also causes the polish to easily experience rancidity due to the enzymatic process and microbial activity that changes an ingredient's nutrient content. This is supported by the statement of Buckle et al. (1987), which states that the nutrient content of a substance will be influenced by enzymatic and microbial activity. According to Juliano (1985) in Janathan (2007), the cause of rice polish experiencing rancidity is a result of free fatty acid oxidation, while the stability of the polish is influenced by lipase activity in hydrolyzing fat.

Munira et al. (2016) the fermentation process of polish is a process that aims to improve the digestibility of the polish. The microorganisms used to depend on the fermentation results to be achieved. Several types of bacteria that are often used in the fermentation process include Saccharomyces sp. and Rhizopus sp. Munira et al. (2016) also reported that giving fermented rice polish can be used as much as 10% in rations, and this does not affect the growth performance of super native chickens that are kept for ten weeks. Thus, to maintain the brown rice polish quality, it is necessary to have fermentation treatment to maintain and preserve the brown rice polish as a source of feed raw material.

Material and Method

Research Methods

Brown rice polish was taken from BMT Bima Sub-district Muntilan, Magelang Regency because the area is a centre for red rice farmers and also many red rice mills. After fermentation for one month, the fermentation results were tested for organoleptic. The variables observed were texture, colour, aroma, flavor, and quality assessment. There were four treatments and five replications for each treatment in this study. The treatments used in the study included:

P0 = Fermentation brown rice polish without the addition of probiotics (control)

P1 = Fermentation rice polish + 0.5% probiotic

P2 = Fermentation rice polish + 1.0% probiotic

P3 = Fermentation rice polish + 1.5% probiotics

Time and Research Sites

The research was conducted for two months, starting from October to November 2020 at the Untidar Faculty of Agriculture Laboratory.

Research Materials and Equipment

Materials used in this study were brown rice polish, molasses, distilled water, and probiotics. The tools used are plastic sacks, 250 mL glass beakers, 100 mL measuring cups, wooden pallets, vacuum cleaners, electric scales with a scale of 1 gram and 0.01 gram, analog scales with a scale of 5 kg.

Procedure for Making Brown Rice Polish Fermentation

The dosage of a solution consisting of 515 ml distilled water, 30 mL molasses, and 10 mL probiotics is mixed until homogeneous. Then the solution is mixed with 1 kg of brown rice polish (which has been homogenized). The brown rice polish that has been mixed with the solution is put into a plastic sack. Then before being tied, sucked using a vacuum cleaner then tied and stored

Organoleptic Test

After one month of fermentation, the plastic sack was opened and assessed by seven trained respondents. The assessment includes colour, texture, aroma, flavor, and quality assessment, as follows:

Texture. Feels soft and aroma good (so you do not need to rinse it off) (Score 25). There is little water, but it is not wet when held (Score 10). There is much water and feels wet when held (Score 0)

Colour. When seen, the colour is brownish red (Score 25). The colour is red and slightly black when observed (Score 10). Black colour (Score 0)

Aroma. If it smells like fruit and has a slightly sour aroma (even it smells very nice) (Score 25). The aroma is fragrant and slightly sour (Score 20). The aroma is sour to strong acidic, but the aroma will disappear (Score of 10). Bad aroma (Score 0)

Flavor. It was flavored sweet and sour like yoghurt (Score 25). It was flavored, slightly sour (score 20). Did not flavor at all (Score 10). The flavor was bad (Score 0).

(Rating) Quality. A score of 80 - 100 (very good) can be used in large numbers. Score 60 - 79 (good) should not be given too much. Score 40 - 59 (sufficient) the number given is small. Scores 0 - 39 (low) should not be assigned to livestock.

Data Analysis

Data obtained were analyzed for a variance with a completely randomized design (CRD). Data were processed with the help of Statistical Product and Service Solutions (SPSS) software version 23.0. Each statement of a significant difference between treatments is based on a probability of less than 5%. The real difference was further tested with *Duncan's Multiple Range Test* (DMRT).

Results and Discussion

The results showed that the addition of probiotic doses increased (P <0.05) flavor and quality assessment but did not have an effect on the texture, colour, and aroma of fermented brown rice made from fermented rice (Table 1).

Table 1. The score of organoleptic brown rice polish fermentation in this research.

Variable	Treatment				SEM	P-Value
	P0	P1	P2	P3		
Texture	10.00 ± 0.00	16.67 ± 0.00	20.00 ± 0.00	20.00 ± 0, 00	0.936	> 0.05
Color	25.00 ± 0.00	25.00 ± 0.00	25.00 ± 0.00	25.00 ± 0.00	0.000	> 0.05
Aroma	20.00 ± 0.00	25, 00 ± 0.00	25.00 ± 0.00	25.00 ± 0.00	0.497	> 0.05
Flavor	10.00^{a} ± 0.00	13.33^{b} ± 0.00	16.67^{c} ± 0.00	20 , 00^{d}± 0.00	0.855	<0.001
Quality Assessment	65.00^{a} ± 0.00	80.00^{b} ± 0.00	86.67^{c} ± 0.00	90.00^{d}± 0.00	2.202	<0.001

SEM = *Standard Error of Means*
P0 = Fermentation brown rice polish without the addition of probiotics (control), P1 = Fermentation brown rice polish + 0.5% probiotics, P2 = Fermentation brown rice polish + 1.0% probiotic, P3 = Fermentation brown rice polish + 1.5% probiotics

Fermentation brown rice polish, which is made in general, is good because the quality assessment score for all treatments is above 60, meaning that the fermented brown rice polish can be given to livestock. The increase in flavor indicator (P <0.05) in treatment P1, P2, and P3 showed that the fermented brown rice polish flavor was more acidic as the increased dose of probiotics. This is presumably because the fermentation process is going well. This is supported by Wallace and Chesson (1995) statement in Wisnu (2009), which states that the fermentation process can be categorized into several phases: the aerobic phase, the fermentation phase, and the stable, and the anaerobic phase. Each of these phases has its characteristics that affect the overall quality. One of the phases that play an essential role is the aerobic phase, in which two metabolic activities occur, namely respiration and proteolysis. Respiration will break down the sugar into carbon dioxide (CO2) and water using oxygen and during this process will produce heat.

Meanwhile, proteolysis will break down protein into amino acids and ammonia. Wallace and Chesson (1995) in Wisnu (2009) also added that the fermentation phase (which is when conditions are anaerobic) would cause anaerobic microorganisms or lactic acid bacteria to start growing and developing. Lactic acid bacteria is an essential microflora because it will produce lactic acid, which affects the quality of preservation.

The probiotics' addition did not affect (P> 0.05) the texture, colour, and aroma of the brown rice polish's fermentation. This is thought to be caused by the fermentation process, and the temperature tends to be stable. This is supported by Utomo (2013), which states that the fermentation process produces lactic acid due to anaerobic bacteria's activity, which produces organic acids. Rahmadi et al. (2013) also added that temperature affects colour, so high temperatures will cause the colour to turn brown and even black, decreasing quality due to reduced carbohydrate content.

Several studies on brown rice have been carried out, one of which is Adzkiya (2011) research, which reports that brown rice has phenolic compounds from the flavonoid class, useful as antioxidants. This is one reason to state that brown rice is superior to white rice in certain aspects. Rice polish has carbohydrates of 47.11%, water content of 12.23%, crude fat of 16.62%, crude protein of 15.09%, and inorganic compounds (ash) of 8.95% (Tengah et al., 2011). Muntana and Prasong (2010) also say that in Thai rice cultivars, brown rice polish has a higher antioxidant activity than black rice polish and white rice polish.

Conclusion

The addition of lactic acid-based probiotics improved flavor and quality but did not affect the texture, colour, and aroma of brown rice polish, assessed organoleptically. It is necessary to do further research related to nutrient content and digestibility of fermented brown rice polish.

References

Adzkiya, M. A. Z. 2011. Kajian Potensi antioksidan beras merah dan pemanfaatannya pada minuman beras kencur. (Thesis). IPB.

Buckle, K.A., R. A. Edwards, G. H. Fleet, and M. Wooton. 1987. Ilmu Pangan. Penerjemah Hari Purnomo dan Adiono. UI-Press, Jakarta

Chen M.H., S. H. Choi, N. Kozukue, H. J. Kim, and M. Friedman. 2012. Growth-inhibitory effects of pigmented rice bran extracts and three red bran fractions against human cancer cells: relationships with composition and antioxidative activities. Journal of Agricultural and Food Chemistry. Vol. 60:9151–9161.

Janathan. 2007. Karakteristik Fisikokimia Tepung Bekatul serta Optimasi Formulasi dan Pendugaan Umur Simpan Minuman Campuran Susu Skim dan tepung Bekatul. Skripsi. Fakultas Teknologi Pertanian. Institut Pertanian Bogor. Bogor.

Munira, S., L. O. Naflu, dan M. Tesse. Performans ayam kampung super pada pakan yang disubttusi dedak padi fermentasi dengan fermentor berbeda. Jurnal Ilmu dan Teknologi Peternakan Tropis. 3(2):21-29.

Muntana N. and S. Prasong. 2010. Study on total phenolic content and their antioxidant activities of Thai White, Red and Black rice bran extracts. Pakistan Journal of Biological Sciences. 13(4):170-174.

Rahmadi, A., I. Abdiah, M. D. Sukarno, dan T. Purnaningsih. 2013. Karakteristik fisikokimia dan antibakteri virgin coconut oil hasil fermentasi bakteri asam laktat [physicochemical and antibacterial characteristics of virgin coconut oil fermented with lactic acid bacteria. Jurnal Teknologi Industri Pangan. 24(2):178-183.

Tengah, I. G. P., I. K. Suter, I. W. R. Widarta, dan I. W. Arnata. 2011. Aktivitas Antioksidan dari Kabupaten Tabanan, Bali. Laporan Hibah Penelitian

Unggulan Udayana. Unpublised. Denpasar

Tuarita, M. Z. 2017. Pengembangan Bekatul Sebagai Pangan Fungsional: Peluang, Hambatan, dan Tantangan. Artikel. Fakultas Teknologi Pertanian. Institut Pertanian Bogor.

Utomo R. 2013. Konservasi Hijauan Pakan dan Peningkatan Kualitas Bahan Pakan Berserat Tinggi. UGM Press. Yogyakarta.

Wallace, R. J. and C. Chesson. 1995. Biotechnology in Animal Feeds and Animal Feeding. VCH. Weinheim.