

***Actinobacillus sp.* ML-08 AS STARTER INCREASE CRUDE PROTEIN AND ORGANIC MATTER CONTENT OF FERMENTED ONGGOK**

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ABSTRACT

Onggok (sludge of cassava) is potential to be animal feed because of the high carbohydrate content. But, the other nutrient contents were low. Fermentation was needed to solve this problem. This study was aimed to prove the potency of *Actinobacillus sp.* ML-08 on increasing crude protein and organic matter content of fermented ongok. The research design used is completely randomized design. There were six treatments: P0: Onggok only, P1: Onggok + 2% Molasses, P2: Onggok + 5% *Actinobacillus sp.* ML-08 + 2% Molasses, P3: Onggok + 10% *Actinobacillus sp.* ML-08 + 2% Molasses, P4: Onggok + 15% *Actinobacillus sp.* ML-08 + 2% Molasses, P5: Onggok + 20% *Actinobacillus sp.* ML-08 + 2% Molasses. Proximate Analysis was done after 7 days of fermentation. The data got from it was analyzed by Analysis of Variance (ANOVA) and continued by Duncan's Multiple Range Test. Research result was showed significant different ($p < 0.05$). The highest concentration of crude protein content is in P4 showed 6.1241% and the highest concentration of organic matter showed 67.7686% in P5 based on partial dry matter. The conclusion of this research is *Actinobacillus sp.* ML-08 can increase crude protein and organic matter in ongok.

Keywords: Onggok, *Actinobacillus sp.* ML-08, Crude Protein, Organic Matter

Introduction

Feed is the main factor in livestock industry. Feeding cost comprised about 65% to 75% of production system (SalooKolayi, 2010). The price which fluctuating and unpredictable is primary obstacle in a farming system. Therefore, farmer need to find the alternative substitution feed to fulfill the animal needs.

Onggok or in English called Sludge of Cassava is a waste of tapioca powder production (Djuwardi, 2009). This high water amount can make

onggok rotted easier and induce contamination in surrounding if not well handled (Suprayogi, 2010). To make it useful, ongok can be use as feed. Onggok has potential to be animal feed because it is contain carbohydrate or starch that high enough so that it can used as energy source (Kalsum and Sjoefjan, 2008). The nutrition value of dried ongok is 1.26% crude protein, 11.24% crude fiber, 88% organic matter (Rokhmani, 2005).

Fermentation is the transformation of food by various bacteria, fungi, and the enzymes they produce. People harness this transformative power in order to produce alcohol, to preserve food, and to make it more digestible, less toxic, and/or more delicious (Katz, 2012). The term 'fermentation' originates from 'fervere' which means to boil (Soccol *et al*, 2013).

Onggok that is potential to be nutritious animal feed can be maximized by fermentation process. *Actinobacillus sp.* ML-08 is one of the bacteria isolated from the rumen of beef cattle (Lamid, 2014). The addition of *Actinobacillus sp.* ML-08 in ongkok powder is expected to increase both crude protein and organic matter.

Research Method

The substances used in this research was ongkok which obtained from Nongkojajar, Pasuruan, East Java. Ongkok was fermented by *Actinobacillus sp.* ML-08 which obtained from Institute of Tropical Disease, Universitas Airlangga, Surabaya.

Bacteria *Actinobacillus sp.* ML-08 that obtained from the laboratorium was cultured in the liquid media which contained 40 mg yeast extract; 5 mg $MgSO_4 \cdot 3H_2O$; 100 mg Na_2HPO_4 , and 46 mg NaCl. All of the substances were dissolved 100 ml by 2 ml aquadest in erlenmeyer. The

tip of the erlenmeyer was closed by cotton and aluminium foil. The solution was sterilized by autoclave in 15 minutes with temperature $121^\circ C$ in the pressure of 1 atm. Isolat that cultured already was used for fermentation. (Lamid, 2013).

This research used completely randomized design. Ongkok was dried and grinded before divided into plastic each 80 grams and divided randomly into 24 units of experiment with six treatment, four replications each. The six treatment were:

P0: Ongkok

P1: Ongkok + Molasses 2%

P2: Ongkok + Molasses 2% + 5% *Actinobacillus sp.* ML-08

P3: Ongkok + Molasses 2% + 10% *Actinobacillus sp.* ML-08

P4: Ongkok + Molasses 2% + 15% *Actinobacillus sp.* ML-08

P5: Ongkok + Molasses 2% + 20% *Actinobacillus sp.* ML-08

Actinobacillus sp. ML-08 prepared based on the dosage which were 5%, 10%, 15%, 20% based on the dry matter of ongkok used and diluted by 40% water of dry matter. Solution which contained 6×10^8 CFU/ml *Actinobacillus sp.* ML-08 and molasses was sprayed onto the ongkok until it was homogenized then the ongkok was put into the plastic, wrapped, and made holes on the plastic. Labeled based on the treatment. Facultative anaerob

fermentation process was done in the drum in 7 days (Setyono *et al*, 2004).

After the fermentation process was done, plastic was opened and ongkok was kept on the open air for a while. Proximate analysis to know the crude protein and organic matter content based on partial dry matter on ongkok after treatment can be done after this.

Data analysis used was Analysis of Variance (ANOVA). If there was differences, analysis continued by Duncan's Multiple Range Test.

Result And Discussion

Nutrient content of crude protein and organic matter content of fermented ongkok is shown on Table 1.

Table 1. The means $\pm$ Deviation Standards of fermented ongkok based on partial dry matter

Treatment	The Mean $\pm$ Deviation Standards (%DM)	
	Crude Protein	Organic Matter
P0	2.5054 ^a $\pm$ 0.37	65.9840 ^a $\pm$ 0.40
P1	3.3929 ^{ab} $\pm$ 0.32	66.3521 ^a $\pm$ 0.56
P2	4.1668 ^b $\pm$ 0.88	67.3652 ^b $\pm$ 0.20
P3	5.5276 ^b $\pm$ 1.18	67.6266 ^b $\pm$ 0.84
P4	6.1241 ^c $\pm$ 0.26	66.8883 ^b $\pm$ 0.96
P5	5.5264 ^b $\pm$ 1.71	67.7686 ^b $\pm$ 0.68

^{a,b, and c} Different superscript in the same column indicated a significant difference ($p < 0.05$)

This increasing crude protein content is caused by reproduction activity of microorganism in the fermentation process (Setyono *et al*, 2004). Bacteria exhibit wide variation in their growth requirements.

The nutritional requirements include source of energy, source of carbon, nitrogen, sulphur, phosphorus, metal ions, organic growth factors, and vitamins (Vasanthakumari, 2007). Reproduction activity of *Actinobacillus sp.* ML-08 is source of single cell protein (Julita, 2013).

Bacteria need nutrition to reproduce and do its basal metabolism. However, if the nutrition in its surrounding is limited, bacteria cannot grow properly. Some of the bacteria will be died because of the rivalry and the activity will be stop.

There is a classical curve about bacteria reproduction that encompassed four phases. They are: lag phase, exponential or log phase, stationery phase, and death phase.

Bacterial growth curve (Barbara *et al*, 2008) explain that bacterial growth can go through decrease line and even reach the lowest line if overcrowding occurs, the concentration of toxic waste products continues to increase and the nutrient supply decreases (Engelkirk *et al*, 2011). After the death of bacteria, the metabolism process

will be stop. This makes single cell protein stops and the protein content in the fermented onggok cannot increase anymore, so that as seen in P5, crude protein content in onggok with the addition of molasses and 20% *Actinobacillus sp.* ML-08 shows no differences with P3 that gave molasses and 10% of *Actinobacillus sp.* ML-08.

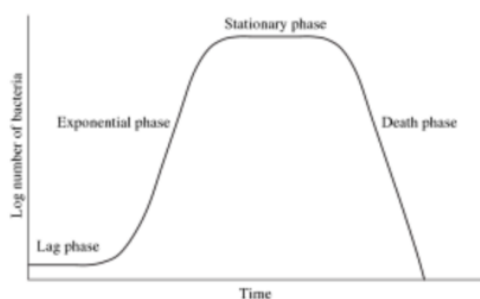


Figure 1. Bacterial Growth Curve
(Barbara *et al*, 2008)

The highest concentration of organic matter is on P5 20%. The research result shows organic matter content increasing in onggok fermented by *Actinobacillus sp.* ML-08 in 7 days, and statistical test shows there is significant different ($p < 0.05$).

Organic matter consists of protein, lipid, carbohydrate, and vitamin. Based on the research done by Nastiti (2013), *Actinobacillus sp.* ML-08 in dosage 20% can decrease the crude fiber of pineapple peels.

Carbohydrate is a part of organic matter. Therefore, the protein content that increasing and the decreasing of the crude protein is the cause of organic matter in the fermented onggok.

Analysis of Variance (ANOVA) showed significant difference ($p > 0.05$). This result indicated there was a differences between treatments. Data analysis was continued by Duncan's Multiple Range Test. After Duncan's Multiple Range Test result shows that the highest concentration of crude protein is in P4 with dosage 15% of *Actinobacillus sp.* ML-08. P0 is different with P2, P3, P4, and P5, but not different with P1.

Meanwhile, it is known that the highest concentration of organic matter is in P5 with dosage 20% of *Actinobacillus sp.* ML-08. P0 is not different with P1 but different with P2, P3, P4, and P5.

The conclusion got from this research was the addition of *Actinobacillus sp.* ML-08 in 10% dosage can increase crude protein and organic matter content on fermented onggok based on partial dry matter.

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