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The Utilization Rice Bran with Lignocellulosic Enzymes to Increase Performances Laying Hen

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ABSTRACT

The purpose of this study to determine the rice bran enzymes lignocellulosic with *spirulina* supplementation on feed intake, average daily weight, feed conversion ratio and feed efficiency in laying hen. The design used in this study is completely randomized design with 5 treatments and 6 replications. Treatment consist of P0 = commercial feed (control), P1 = feed commercial 95% + 5% fermented rice bran + 1.5% spirulina, P2 = commercial feed 90% + 10% fermented rice bran + 1.5% spirulina, P3 = commercial feed 85% + 15% fermented rice bran + 1.5%, spirulina, P4 = Feed commercial 80% + 20% fermented rice bran + 1.5% spirulina. The dependent variable in this study is the feed intake, average daily weight, conversion rate and feed efficiency. Statistical analysis using ANOVA with F test showed have significant differences among treatments ($p< 0.05$). The conclusions treatment P3 provides the best performances laying hens.

KEYWORDS: feed intake, average daily weight, feed conversion ratio, feed efficiency, enzymes lignocellulosic

INTRODUCTION

Rice bran is a byproduct of the milling process rice plants are widely used as raw material for animal feed. Primary cell wall of plants have a complex structure, namely: 1. The polysaccharide composed of cellulose (polymer ß-1,4-glucose), hemicellulose (xylose, galactose or mannose primer), and pectin which includes polymethyl¬galacturonic acid and polygalacturonic acid, 2 . Lignin (phenylpropane polymer), and 3. The glycoprotein. These substances hydrolysis process carried out by enzymatic biotechnology [2]. Constraints utilization of rice bran as animal feed that contains most of the high crude fiber composed of cellulose, hemicellulose and lignin. Cellulose and hemicellulose are crude fiber which is the main constituent of plant cell walls, is one of the organic material contained in large quantities in nature and are a source of energy (renewable energy sources) of high potential for livestock. Limitations of the use of cellulose and hemicellulose of rice bran in poultry, the birds do not have the enzyme-producing microbes lignocelluloses.

To solve the problems of nutritional quality of food (rice bran) is low, we need a technological breakthrough enzymatically in the processing of animal feed, which can include manipulation of feed that is with the addition of enzymes lignocellulosic in degrading bonding between cellulose, hemicellulose, the lignin in the process of degradation of agro-industry waste for poultry feed. Lignocellulosic enzymes formed an enzyme complex consisting of the enzyme cellulase and hemicellulase. Cellulase enzymes consisted of three components of the enzymes that were Cx component (endo-β-1,4-glucanase), C1 component (β-1,4-glucan cellobiohydrolase or exo-β-1,4-glucanase) and components cellobiase (β-glucocidase) [2,3]. An essential enzymes complex for the degradation of the hemicellulose component of the enzymes xylanase consisted of five component of the enzyme endoxylanase-β-1.4, β-xylosidase, α-L-arabinofuranosidase, α-D-glukuronidase, and acetyl xylan esterase [4]. Lignocellulolytic enzymes group could ferment cellulose and hemicellulose into glucose and xylose by enzymatic

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process . Information lignoselulase the use of enzymes for enzymatic process on a byproduct of agricultural waste (rice bran) for poultry feed. The usefull cellulase and hemicellulase enzymes (enzymes lignocellulosic group) will be able to increase the nutritional value of rice bran. Information lignocellulosic the use of enzymes for enzymatic process on a byproduct of agricultural waste (rice bran) for poultry feed is still limited.

Processing with chemicals cause environmental pollution, while the biological safety is guaranteed. This study is expected to be commercially lignocellulosic enzymes at an economical cost which serves to degrade the feed material byproduct of agricultural waste (rice bran) coarse fibrous high quality in the provision of animal feed to improve livestock productivity of broilers and laying hens. This study is expected to be commercially lignocellulosic enzymes at an economical cost which serves to degrade the feed material byproduct of agricultural waste (rice bran) coarse fibrous high quality in the provision of animal feed to improve livestock productivity of broilers and laying hens.

MATERIALS AND METHODS

All the ingredients were fermented for one week with a doses of lignocellulosic enzymes 4%. This study used a completely randomized design with five treatments and six replications, all the materials in this study were made uniform. Factors lignocellulosic enzymes dose tested their effects on the nutritional content of rice bran : P0 = commercial feed (control), P1 = feed commercial 95% + 5% fermented rice bran + 1.5% spirulina, P2 = commercial feed 90% + 10% fermented rice bran + 1.5% spirulina, P3 = commercial feed 85% + 15% fermented rice bran + 1.5%, spirulina, P4 = Feed commercial 80% + 20% fermented rice bran + 1.5% spirulina.

All materials were fermented for 5 days. Fermented rice bran performed for each treatment using the appropriate dose of lignocellulosic enzymes treatment. Rice bran put in a plastic bag labeled experimental and facultative *anaerobic* fermentation of rice bran is seven days. After an incubation period of seven days is complete, the sample was opened and analyzed content of nutrients. Laboratory analysis was performed to measure the dry matter (DM), organic matter (BO), crude protein (CP), crude fiber (SK) using the methods of AOAC [5]. The dependent variable in this study is the feed intake, average daily weight , conversion rate and feed efficiency. The results of the study were analyzed using analysis of variance, followed by Duncan 's Multiple Range Test [6] .

RESULTS AND DISCUSSION

Average Performance of laying hens to feed formula lignocellulosic enzymes with *spirulina* on Table 1.

Tabel 1. Average Performance of laying hens to feed formula lignocellulosic enzymes With *spirulina*

Performances	Treatment				
	P0	P1	P2	P3	P4
Feed intake(g/day/tail)	105.99^{b}	106.51^{b}	107.76^{ab}	108.45^{a}	109.21^{a}
Average Daily Weight (g/day/tail)	52.66^{a}	50.68^{a}	51.93^{a}	51.45^{a}	44.35^{b}
Conversion rate	2.10^{a}	2.15^{ab}	2.22$^{a b}$	2.23^{ab}	2.32^{b}
Feed efficiency (%)	69.07^{a}	68.68^{a}	67.91^{a}	66.69$^{a b}$	64.61^{b}

The amount of food that can be consumed by livestock will affect the productivity of livestock, while the growth rate also is associated with the consumption of feed. Perfection balance of nutrients in feed intake is essential for optimum growth. Calculation of feed consumption used later to measure the feed conversion ratio. Many say the least feed consumption is influenced by several factors such as the physical form of feed, the balance of

the content of nutrients in feed, feed quality, body weight of livestock, production levels, growth rate, system maintenance, environmental conditions temperature of the environment, livestock type, gender, the energy level of feed.

Number of different nutrients in the feed will affect the high and low consumption of feed that can affect the productivity of the eggs produced. Feed energy levels will determine the amount of feed consumed. High levels of energy that causes the amount of feed less, whereas if the energy content of the feed is too low, then consumption will be increased to meet the energy needs [7]. The energy level in the feed which determines the amount of feed consumed. Broiler chickens that consume more feed is not necessarily better growth because growth is influenced by the composition of the substances contained in the food ration. Protein consumption is then used to calculate the protein efficiency ratio. Growth generally expressed by measuring the weight gain that is done by weigh repeatedly and shown in the form of weight gain every day, every week or any other time. In general, weight gain is influenced by the consumption of feed eaten and nutrient content contained in the feed [8].

Feed conversion ratio is the ratio between the number of kg of feed consumed by the number of weight gain. Calculation of feed conversion is intended to determine the ability of chickens studied the change of feed consumed to produce daily weight gain, and also to see the response to the quality of livestock feed given. If the feed conversion in livestock is getting low, the results obtained are also more profitable. High feed conversion in P4 treatment due to lower feed intake and weight gain were also lower. This is partly due to the treatment feed formula contains rice bran lignocellulosic enzymes allows the feed is not digested in the digestive process the chicken so that the utilization of feed nutrient elements that are less efficient can lead to increased feed conversion value. In contrast to the treatment of P0, P1, P2 and P3 showed a lower feed conversion due to high feed intake and weight gain was offset by higher still anyway.

CONCLUSION

Addition of lignocellulolytic enzymes into rice bran improved significantly the quality of rice bran. The research showed have significant differences among treatments for feed intake, average daily weight, conversion rate and feed efficiency($p< 0.05$), and the conclusions treatment P3 provides the best performances laying hens..

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REFERENCES

1. Juhasz, T., Z. Szengyel, K. Reczey, M Siika-Aho, L. Viikari. 2005. *Characterization of cellulases and hemicellulases produced by Trichoderma reesei on various carbon sources*. Process Biochemistry 40 (2005 3519-3525 Elsevier Ltd.
2. Yu B, Wu ST, Liu CC. 2007. Effects of enzyme inclusion in a maize-soybean diet on broiler performance. *Anim Feed SciTechnol*134: 283–294.
3. Khan Shahzad Ashraf, Haroon Rashid Chaudhry, Yasser, Saleem Mustafa and Tariq Jameel. 2013. The effect of phytase enzyme on the performance of broilers. (Review). *Biologia* (Pakistan) 2013, 59 (1), 99-106 PK ISSN 0006 – 3096.
4. Deshpande, S.S. and Cheryan, M., 1984, *J. Food Sci.*, 49, 516-524.

5. AOAC.2005. Official Methode of Analysis of The Association of Official Analytical Chemist. Association of Official Analytical Chemist. Arlington.
6. Steel, R.G.D. and J.H. Torrie. 1980. Principles and Procedure of Statistics. McGraw-Hill Book Co. Inc. New York.
7. Rodrigues MAM, Pinto P, Bezerra RMF, Dias AA and Guedes CVM. *Anim. Feed Sci. Technol.,* 2008, 141: 326- 338.
8. Tricarico JM, Johnston JD, Dawson KA, Hanson KC, McLeod KR and Harmon DL. *Anim. Sci*., 2005, 81: 365- 374.