

Combination of Rice Bran with Phytase Enzymes and Menhaden Fish Oil to Increase the Essential Fatty Acids (Omega-6) in Broiler Meat

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ABSTRACT

Most of the poultry feed ingredients in Indonesia are still imported while available local potential feed ingredients such as rice bran are available throughout the year. Rice bran contains fiber and phytic acid so its utilization as poultry feed requires supplementation of fiber-breaking phytase enzymes. This research has purpose to know the quality of chicken meat which include the essential fatty acids omega-6 in broiler meat with the addition of phytase enzymes and supplementation of menhaden fish oil. This research uses experimental method in vivo with Completely Randomized Design consisting of five treatments and seven replications. The treatment provided is commercial feed which is rice bran addition phytase enzymes with supplementation of menhaden fish oil with different dose. In this study, the amount of rice bran substituted on commercial feed is: treatment of P0 (0%), P1 (5%), P2 (10%), P3 (15%) and P4 (20%). The conclusion of this research showed that rice bran with phytase enzymes and supplementation of menhaden fish oil can increase can essential fatty acids omega-6 so safe for human consumption.

KEY WORDS: rice bran, phytase enzymes, menhaden fish oil, omega-6

INTRODUCTION

Phosphorus in bran is in the form of phytate or phytic salt. Phytic acid ($C_6H_{18}O_2P_6$ or IP_6) structurally is a phosphate-bound full myo-inositol ring around the ring [1]. Poultry is unable to digest the phytate because it has no phytase enzymes in its body [2]. Phytic acid can reduce protein solubility, because phytic acid readily reacts with proteins to form protein-phytate complexes. The formation of phytate-mineral compounds or insoluble proteins can lead to decreased mineral availability and nutritional value of dietary protein. The minerals and proteins that form the complex with the phytate can not be absorbed by the intestinal wall for livestock [3]. Unproven phytate results in a negative effect on digestion of minerals and proteins [4].

Potential local feed materials used as poultry feed include rice bran, palm kernel cake, and coconut meal. Rice bran has been widely used as one of the ingredients of feed, including broiler chickens. If rice bran can be used in large quantities then the cost of rations can be suppressed. However, the increase of bran in ration also at the same time increase the content of crude fiber and phytate compounds are high while the poultry is not able to digest the fiber and phytate because it does not have the enzyme breaking fiber and phytate in the body. Therefore, it is necessary to add phytase enzymes fiber-breaking to improve the nutrient digestibility and its benefits for poultry production. Microbial breaking enzymes derived from microbes (*Bacillus villimoris*) are expected to be effectively used in feed containing bran. In addition, supplementation of phytase enzymes 500 U/kg in broiler ration can improve performance and increase the use of P, Ca, Mg and Zn [5].

The fatty acid composition of broiler meat can be changed by changing the fatty acid composition of the broiler feed formula. Development of field of animal feed technology is needed to modify the composition of poultry products enriched with menhaden fish oil supplementation. One source of feed ingredients that can affect the composition of chicken meat is menhaden fish oil. Menhaden fish oil derived from marine fish is a source of polyunsaturated fatty acids (PUFA) which contains many long-chain fatty acids such as omega-3 and omega-6. The research was intended to

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determine essential fatty acids omega-6 in broiler meat with the addition of phytase enzymes and supplementation of menhaden fish oil.

MATERIALS AND METHODS

This study used a complete randomized design with five treatments and seven replications. The treatment feed used in this study consisted of: P0 = BRI (control), P1 = BRI 95% + 2% menhaden fish oil + rice bran with phytase enzymes 5% P2 = BRI 90% + 2% menhaden fish oil + rice bran with phytase enzymes 10% P3 = BRI 85% + 2% menhaden fish oil + rice bran with phytase enzymes 15% P4 = BRI 80% + 2% menhaden fish oil + rice bran with phytase enzymes.

Note : BRI (Commercial feed).

Table 1. Average Nutritional Content of Rice Bran with Phytase Enzymes and Supplementation Menhaden Oil Fish

Nutrition (%)	Treatment				
	P0	P1	P2	P3	P4
Dry matter	89.9378	89.6889	89.775	89.4605	89.2271
Ash	8.96005	8.5535	8.9095	8.7201	8.8571
Crude protein (CP)	23.0142	23.306	23.7046	23.7684	23.8779
Extract Eter (EE)	8.2439	9.3969	8.5014	8.7869	8.6904
Crude fiber (CF)	8.5236	8.4574	7.8831	7.9143	7.8396
Organic matter (OM)	80.978	81.1354	80.8655	80.7404	80.37
Nitrogen Free Extract (NFE)	41.19613	39.9751	40.7764	40.2708	39.9621
Calsium	2.3977	2.7403	3.2295	3.0174	3.8036
EM (Kkal/kg)	2896.17	2943.80	2920.74	2924.89	2910.06

This research takes three periods namely adaptation period, introduction and data collection. Male broilers are kept until the age of 35 days, then harvested. The research variables consist of: omega 3 and Omega fatty acids. Data analysis using Variant Analysis (ANOVA) with the research design is Completely Randomized Design (RAL) to know the difference in treatment. If there is a difference in the treatment then Duncan Multiple Range Test [6].

RESULTS AND DISCUSSION

The results of the research on broiler meat obtained by omega-3 and omega-6 unsaturated fatty acid data are presented in Table 2.

Table 2. The Average Content of Linoleat acid and Arachinodat Acids (Omega-6) in Tilapia Fish Meat

Nutrition (%)	Treatments				
	P0	P1	P2	P3	P4
Linoleat acid	15.755 ^a	19.228 ^b	20.077 ^b	19.107 ^b	19.131 ^b
Arachinodat acid	0.198 ^a	0.354 ^b	0.359 ^b	0.371 ^b	0.367 ^b

Sources of omega-3 and omega-6 fatty acids are one of them is menhaden fish oil. Menhaden fish oil has polyunsaturated fatty acid content (PUFA) of 4.61% higher than commercial feed. In addition, menhaden fish oil have omega-3 content of 3.75% and omega-6 by 0.86%. Provision of fish oil in broiler feed can increase the content of omega-3 and omega-6 which is beneficial for growth and better survival in broiler meat, so as to improve human health. Naturally broiler is not able to synthesize unsaturated fatty acids, therefore required intake of omega-3 and Omega-6 fatty acids. Based on that, the linoleate acid and arachnidan acid (omega-6) content are increased through menhaden fish oil supplementation containing omega-3 and omega-6 fatty acids in broiler feed.

Degradation of phytic acid is a disconnection between the bonding process groups inositol and myo-phosphoric acid groups of the enzymes phytase produced by rumen microbes [7]. Further explained that the phosphate is released will be used as a source of mineral phosphorus [8], which in turn is having a beneficial effect on growth performance, feed efficiency, digestibility, energy utilization, mineral retention, and bone growth of broiler chickens as a direct hydrolytic effect on phytate [9]. Degradation of phytic acid by enzymes phytase produced from the bacteria *Bacillus vallimortis* more regularly than chemical degradation of phytic acid on anaerobic fermentation process. Termination of phytate bonds occur randomly in irregular bond, thus causing a high value and nutrient digestibility be released soon be directly utilized by the animal body.

CONCLUSION

The conclusion of this research showed that rice bran with phytase enzymes and supplementation of menhaden fish oil can increase essential fatty acids (omega-6) so safe for human consumption.

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