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THE USE OF POLLARD AND CRITICAL AMINO ACID ADDITION IN THE DIETS ON STARTER PERFORMANCE OF LAYER

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Abstract

The objectives of this study were to evaluate the effect of pollard utilization and addition of critical amino acid (methionine, lysine, tryptophan and threonine) on the growth performance of layer. Three hundred and ninety nine day old chicks of Lohman layer strain were used in the experiments. The birds were allocated into treatments of pollard level consisting of 0, 10, 20 and 30% of the diets and addition of critical amino acid 0,5 and 1 time of amino acid contents in the control diets (P.0, P.1, P.2, P.3, P.4, P.5 and P.6). The iso-protein and iso-calory diets were made and formulated according to NRC (1994). The result showed that utilization and addition of critical amino acid were significantly affected ($P<0.05$) body weight (353,50, 384,20, 411,40 396,49, 378,94, 353,50 and 330,70g), feed consumption (1171,30, 1185,00, 1073,31, 1210,35, 1071,47, 1195,47 and 1251,04g) and feed conversion (3,68, 3,41, 2,84, 3,36, 3,09, 3,77 and 4,21) but not the liver (9,34 9,47 9,83 8,73 9,04 8,57 and 8,78g) and bile (0,64, 0,65, 0,63, 0,78, 0,60, 0,66 and 0,64g) weights, also on trygliceride (84.21, 63.16, 70.18, 45.62, 56.14 and 52.63mg/dl) and cholesterol of blood plasma (114.67, 93.33, 88.00, 104.00, 93.33, 82.67 and 112.00 mg/dl).

Key words: Pollard, Amino acid, Liver, Bile, Blood plasma, Trygliceride, Cholesterol

Introduction

The starter period of layer hens is critical, because this phase would determine physical performance of layer. Many researchers reported that increasing crude fibre and protein included amino acid in the diets would reduce fat and cholesterol content in the egg or muscle.

Connell (1981), explained that high-fibre diets are known to increase the rate of feed passage through the gastrointestinal tract and thus may result in lowering the actual ME values of the diets. Menge *et al.* (1974) mentioned that 150 g cellulose/kg diets decreased serum cholesterol but it increased egg cholesterol. Longe (1984) reported that in chickens, the dietary crude fibre was not digested, hence affecting nutrient availability and absorption. It is known that the adsorptive nature of fibre may reduce the availability of other nutrients, such as mineral.

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For efficient poultry production, it is important to clarify the CP and amino acid requirements, and the factor affecting the requirements (Ishibashi and Ohta, 1999). When whole egg protein, fish meal and soybean meal were used as main protein sources, the maximum body weight gain of broilers was achieved at 14,5, 6,5 and 21,9 of CP, respectively (Koide *et al.*, 1992). In 21,9% CP soybean meal, methionine requirement was satisfied, suggesting that it is not protein but amino acids which is needed for the maximum BW gain. The nutritional value of protein varies between feedstuff. It is possible to feed animals using crystalline amino acids as a sole nitrogen source, but in practice only some limiting amino acid are added to the diet (Ishibashi and Ohta, 1999).

Pollard is wheat by-products industry contents of 16.10% crude protein, 6.60% crude fibre (Hari-Hartadi *et al.*, 1986), and 15.00% crude protein, 7.50% crude fibre (NRC. 1994). The objectives of this study were to evaluate the use of pollard and critical amino acid addition in the diets on starter performance of layer.

Materials and Method

A study was carried out with 315-day-old male layer Lohman strain. The birds were randomly divided into seven diet treatments (3 replicates of 15 birds each). The birds were fed by their respective diets containing three levels of pollard (10, 20 or 30 %) and added 0,5 and 1 time of critical amino acid (met, lys, tryp and threo) based on control diet for each levels of pollard (Table 1). All the treatment diets were formulated to have 17% crude protein and 2800 kcal ME, 0.90% Ca and 0.40% P. Feed and water were available ad-libitum throughout the experiment.

Table 1. Treatment layout of pollard and critical amino acid level in the diets

Treatment	Pollard Level (%)	Critical amino acid (%)	Replication	Number of Chickens
Control (P0)	0	0	3	45
Diet 1 (P1)	10	0,5 x CAA of P.0	3	45
Diet 2 (P2)	10	1,0 x CAA of P.0	3	45
Diet 3 (P3)	20	0,5 x CAA of P.0	3	45
Diet 4 (P4)	20	1,0 x CAA of P.0	3	45
Diet 5 (P5)	30	0,5 x CAA of P.0	3	45
Diet 6 (P6)	30	1,0 x CAA of P.0	3	45

Note: CAA=critical aminio acid (met, lys, tryp and threo)

The experiment was performed until the birds were 6 weeks of age and blood sample were taken for measuring trygliceride and cholesterol then they were slaughtered and liver and bile determined. During the experiment live weight of the birds, feed intake and feed conversion ratio (FCR) was measured on weekly basis.

The data were statistically analysed using the one-way analysis of variance by using SAS system for Windows release 6.12.

Results and Discussion

The results showed that utilization of pollard and amino acid addition in the diets were significant effect on feed consumption, body weight, FCR and but not on mortality at 42 day age (Table 2). The performance of the birds fed high levels of pollard (30%) in the diets P.5 and P.6 resulted in a significant decrease in the body weight, but followed by increasing feed consumption and FCR although had added amino acid. These results were caused by increasing levels of pollard resulted in increased levels of crude fibre of the feed and consequently increased feed intake.

Table 2. Utilization of pollard and amino acid addition on performance at 42 days of age

Treatment	Feed consumption g/hen/day	Body Weight (g/hen)	FCR	Mortality
P.0	1171,30 ab	353,50 ^{bc}	3,68 abc	0
P.1	1185,00 ab	384,20 ^{ab}	3,41 bcd	0
P.2	1073,31 b	411,40 ^{a}	2,84 d	0
P.3	1210,35 a	396,49 ^{a}	3,36 bcd	0
P.4	1071,47 b	378,94 ^{ab}	3,09 cd	0
P.5	1195,47 a	353,50 ^{bc}	3,77 ab	0
P.6	1251,04 a	330,70 ^{bc}	4,21 a	0

^{a,b} Means within column with different superscripts are significantly different ($P<0.05$)

Chickens do not totally digest crude fibre because there are few cellulolytic microorganisms in chicken gut, which produced cellulose enzyme for digestion of crude fibre. This might influence the nutrient availability and finally influence the growth. As reported by Parsons *et al.* (1983) high dietary fibre can provoke an increase sloughing of intestinal epithelial cells, causing an increase in secretion of mucous into the intestine, which leads to losses of endogenous amino acids. Longe (1984) reported that in chickens, the dietary crude fibre was not digested, hence affecting nutrient availability and absorption. It is known that the adsorptive nature of fibre may reduce the availability of other nutrients, such as mineral.

Table 3 shows that the use of pollard and critical amino acid addition in the diets did not significantly affect on liver and bile weight and blood profile at 42 days of age.

Table 3. Utilization of pollard and amino acid addition on liver and bile weight and blood profile at 42 days of age

Treatment	Liver weight (g)	Bile weight (g)	Blood trygliseride (mg/dl)	Blood cholesterol (mg/dl)
P.0	9,34	0,64	84.21	114.67
P.1	9,47	0,65	63.16	93.33
P.2	9,83	0,63	70.18	88.00
P.3	8,73	0,78	45.62	104.00
P.4	9,04	0,60	56.14	93.33
P.5	8,57	0,66	52.63	82.67
P.6	8,78	0,64	39,60	112.00

The data of liver and bile weight indicated that function of liver for fat metabolism is not complete yet at 42 days of age, however blood trygliceride and cholesterol indicated decrease accordance with increasing levels of pollard and critical amino acid addition in the diet.

Conclusion

The use of pollard and critical amino acid in the diets on starter performance of layer has significant effect on feed consumption, body weight, FCR and but not on mortality, liver and bile weight and trygliceride and cholesterol of blood at 42 day age.

References

Connell, A. M. 1981. Dietary Fibre. In Physiology of Gastrointestinal Tract. L. R. Johnson, Ed. Raven Press. New York. NY.

Hari-Hartadi., S Reksohadiprojo dan A.D. Tillman (1986). Tabel Komposisi Pakan untuk Indonesia. Gadjah Mada University Press. Yogyakarta.

Ishibashi, T. and Y. Ohta .1999. Recent advances in amino acid nutrition for efficient poultry production. (review). Asian-Aus. J. Anim Sci. Vol. 12. No. 8: 1298-1309.

Koide, K., E Watanabe., M. Toyomizu and T. Ishibashi. 1992. Effects of dietary protein sources on performance and plasma amino acid concentration of broilers. Jpn. Poult Sci. 29:368-377.

Longe, O. G. 1984. Effect of increasing the fibre content of a layer diet. Br. Poultry Sci. 25:187-193.

Menge, H., L. H. Littlefield., L.T. Frobishand B. T. Weinland. (1974) Effect of cellulose and cholesterol on blood, yolk lipids and reproductive efficiency of the hen. Journal of Nutrition, 104:1551-1566

National Research Council. 1994. Nutrient Requirements of Poultry. 9th rev. ed. National Academy Press. Washington.DC.

Parsons, C. M., Potter, L. M. and R. D. Brown. Jr. 1983. Effect of dietary carbohydrates and of intestinal microflora on excretion of endogenous amino acids by poultry. Poultry Sci. 79:77-79.