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PERFORMANCE AND PROTEIN EFFICIENCY OF BROILER CHICKEN FED "ONCOM" OF TAFU BY-PRODUCT

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SUMMARY

The research was conducted at Poultry Production Laboratory, Faculty of Animal Husbandry, Diponegoro University Semarang. The aimed of this research was to investigate the effect of "oncom" of tofu by product (OTBP) on the diet to performance and protein efficiency of broiler chicken. One hundred broiler chicks unsex, one week old with initial body weight 118,45±12,34g were used in this experiment. The chicks were reared on the litter house system. They were divided into 20 pen (100 x 75 x 60 cm), and each pen contained 5 chicks. The bird were fed diet consisted of yellow corn, rice polish, fish mill, mineral and vitamin mix and OTBP. The diets for starter and grower are 22 and 20% CP and 2.900 and 3.000 kcal/kg diet. The experimental design was completed randomized design (CRD) with 4 treatments and 5 replications each. The treatments were: diet with 0% OTBP (TO); diet with 10% (T1) OTBP; diet with 15% OTBP (T2); diet with 20% OTBP (T3). The result showed that average feed consumption of T0, T1, T2 and T3 were 2.201; 2.095; 2.100 and 2.104g respectively. Average body weight gain it is 896; 963; 984 and 1.038 g for T0, T1, T2 and T3 respectively. Average feed conversion of T0, T1, T2 and T3 are 2,21; 2,18; 2,14 and 2,03 respectively. Average carcass weight are 651; 668, 704 and 746 g for T0, T1, T2 and T3 respectively. Average carcass percentage of T0, T1, T2 and T3 were 62,06, 63,44; 63,86 and 66,13 % respectively. The average protein efficiency is 2,17; 2,20; 2,18 and 2,40 for T0; T1; T2 and T3 respectively. It can be concluded that "oncon" of at level 20% can be used in the diet for good performance and efficient of broiler chicken

Key Words: *Tofu by-product, "oncom" fermentation, performance, protein efficiency broiler chicken*

INTRODUCTION

The feed has very important role, because in the rearing broiler chicken have two value, i.e. economic value and biologic value. The economic value of feed consider to cost of feed raised to 70 ~ 80% of total production cost, will the biological value consider and to secure of performance and efficiency protein of broiler chicken. Broiler chicken industries will be succeed if able to make feed formulation with higher economic and biological values. They have to look for alternative feedstuff having higher economic and biological values, with abundance stock and without human competition need. Tofu by-product has been used as a feed of cattle, pork, and was explored as a chicken feed (Mahfudz, *et al.* 1999). The tofu by-product had good nutrition, with the protein contain 16 ~ 20%, with higher lysine and methionine. But,

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tofu by-product as a chicken feedstuff have obstacle that is higher on water and fiber contents, so that, store time and digest are lowers. In the past research, tofu by-product as a boiler chicken feedstuff restriction only 7.5% (Mahfudz, *et al.* 1999).

Therefore, before used as a feedstuff for ration, tofu by-products were fermented by "oncom mold". The fermentation will raise digestibility and nutritive value, of tofu by product especially protein and B vitamin. Oncom mold was chosen for the fermentation because it product have red color and the good smell that increace it palatable to chicken. Beside that, oncom has slight higher protein and B vitamin contently compared with "tempe gembus" (Surya, 2003).

The aim of this research was to investigate the use of tofu by-product as a feed on performance and protein utility efficiency of broiler chicken.

MATERIALS AND METHODS

Material

One broiler chicks unsexed, one week old with average initial body weight 118,45 ± 12,34g was used in the experiment. The birds were reared chicks was housed at litter system housed, divided into 20 groups and each group was placed in a pen containing 5 birds is (100 x 75 x 60 cm).

Feed

The feed was, for starter and grower were 22 and 20% crude protein and 2.900 and 3.000 kcal/kg of feed respectively. All feed ingredients were compri yellow corn, rice polish brand, soybean cake, fish meal, top mix and fermented tofu by-product meal (FTBPM) by *N. Sitophila* strain.

The row tofu by-product was washed with clean water, and than pressed for decrease water content for avoiding the decay of the tofu by product the fermentation process. After steaming for 1 hour, and than cooling for 45 minutes, the warm tofu by-product was inoculated by 1% *Neurospora sitophila* from (weighed of tofu by-product) and incubated for 2 nights. Fermented tofu by-product than cutting slightly and dried by sun until the water content 14% and milling for meal.

The composition and nutrition of feed experiments for starter and grower period are displayed at Table 1 and 2.

The birds were reared at litter system housed that divided into 20 compartment, and every compartment 100 x 75 x 60 cm consist of 5 chicks. The diet and drinking water were given *ad libitum* during experiment.

The data collected was included feed consumption, protein consumption, body weight gain, carcass percentage and protein efficiency

Method

Experimental design was Completely Randomized Design (CRD) with 4 treatments and 5 replication, and every experimental unit consists of 5 chicks. The parameters were feed consumption, protein consumption, body weight gain, carcass percentage and protein efficiency.

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Table 1. The Composition Feedstuff and Nutritive Content of Experiment Diet For Starting Period

Feedstuff	Treatments			
	T0	T1	T2	T3
	..... g			
Grounded yellow corn	34,75	32,00	31,50	29,25
Rice brand	28,75	24,50	21,25	20,25
Soybean cake	27,50	24,50	23,25	21,50
Fish meal	8,00	8,00	8,00	8,00
Fermented tofu by-product	0,00	10,00	15,00	20,00
Top mix	1,00	1,00	1,00	1,00
Total	100,00	100,00	100,00	100,00
Nutritional:				
EM (kkal/kg)	2.931,95	2.930,60	2.938,89	2.929,25
Protein (%)	19,53	19,63	19,57	19,55
Fat (%)	5,50	5,49	5,23	5,10
Crude fiber (%)	5,10	5,78	6,33	6,71
Ash (%)	7,12	7,07	7,00	7,02
Ca (%)	0,80	0,90	0,95	1,00
P (%)	0,79	0,81	0,82	0,84

Information: Ca = calcium; P = phosphor; EM = energy metabolize

Table 2. The Composition Feedstuff and Nutrition Contain of Experiment Diet For Growing Period

Feedstuff	Treatment			
	T0	T1	T2	T3
	..... g			
Grounded yellow corn	46,25	43,75	42,25	41,00
Rice brand	22,75	18,25	16,00	13,75
Soybean cake	23,00	20,00	18,75	17,25
Fish meal	7,00	7,00	7,00	7,00
Fermented tofu by-product	0,00	10,00	15,00	20,00
Top mix	1,00	1,00	1,00	1,00
Total	100,00	100,00	100,00	100,00
Nutritional:				
EM (kcal/kg)	3.001,24	3.002,07	3.001,61	3.002,03
Protein (%)	17,70	17,70	17,77	17,79
Fat (%)	5,42	4,95	4,70	4,64
Crude fiber (%)	3,23	4,92	5,45	6,25
Ash (%)	6,30	6,00	5,97	5,93
Ca (%)	0,81	0,91	0,96	1,01
P (%)	0,80	0,82	0,83	0,84

Information: Ca = calcium; P = phosphor; EM = energy metabolize

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The data collected was analilyzed by Analysis of Variance (ANOVA) with F test to know the effect of treatment. If, there were affected by treatment continued with Duncan Multiple Range test (Sudjana, 1996).

RESULTS AND DISCUSSION

Effect of Treatment on Average Feed and Protein Consumptions and Protein Efficiency. The effect of fermented tofu by-product meal (FTBPM) in the diet on Feed and Protein Consumptions and Protein Efficiency were shown at Table 3.

The result shown that feed consumption was lower when compared by Arbor Acres (AA) standard for 6 weeks old is 2.548 g. The lower on feed consumption was caused by the high house temperature during the rearing especialy at week 1 until week 5 (30 – 33°C), so that, the chicken consumed more water consumption and decreased feed consumption. Regarding on opinion of North and Bell (1990), Ensminger (1997) and Mahfudz *et al.* (1996[a], 1997[b], 1999) on the hot climate the chicken will be more drunk and decreased feed consumption. Result of analysis of variance showed that feed consumption significantly increased (P<0,05) by increased FTBPM level on the diet (Table 3). The increase of feed consumption was due to the FTBPM contained glutamic acid and vitamin B. There two materials can increase palatability of the rithem, subsequently it increased feed consumption. This is agreement with Anggorodi (1995) and Mahfudz et al. (1996[a],1999), stated that feedstuff fermented was rich in glutamic acid and vitamin B. Beside that, the increasing feed consumption also caused by increasing digestion of feed caused by fermentation. Increasing digestion resulted in the increasing feed flowing in the tractus digestivus (Sutardi, 1981; Tillman *et. al.,* 1991 and Mahfudz *et al.,*1999).

Protein consumption of broiler chicken fed diet consisted of FTBPM significantly (P<0,05) increased. The multiple range test shown that FTBPM caused significantly different (P<0,05) between T0 with T1, T2 and T3, but between T1, T2 and T3, did not significantly different. The benefit of fermented feedstuff were resulted in vitamin B, increased digestibility, protein quality and essential amino acid, were needed by broiler chicken. Berg and Butterfield (1976); Haris and Karmas (1989); Fardias (1989), Safro *et al.* (1992) and Mahfudz, *et al.* (1996[b];1999; 2000) stated that feedstuff was fermentation process, the protein quality will be better them original feedstuff.

Table 3. Average Feed and Protein Consumptions and Protein Efficiency of Broiler Chicken During Experiment

The Parameter	Treatment			
	T0	T1	T2	T3
Feed Consumption (g)	2,023[a]	2.095[b]	2.100[b]	2.104[b]
Protein Consumption (g)	425,80[a]	440,22[b]	450,76[b]	442,55[b]
Protein Efficiency	2,17[a]	2,20[a]	2,18[a]	2,40[b]

Information: Superscript different on same line shown significantly different (P<0.05)

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FTBPM significantly (P<0,05) increased protein efficiency of broiler chicken. Multiple range test shown that FTBPM in the diet at 20% (T3) level was significantly (P<0,05) higher than T0, T1 and T2. Increasing protein effisiency on 20% level FTBPM in the diet, was donethe diet that rich with amino acid, for syntesis of protein, also vitamin B as a co-enzym on the protein metaboliz process. Mahfudz, *et al.* (1996[b], 1997[a] dan1999) added that fermented feedstuff rich on vitamin B, very important as a co-enzyme for transaminases process, that promote protein metabolism. The protein metabolism increase, resulted on increasing protein efficiency.
The increasing digestibility of fermentation feedstuff caused hungry feeling of chicken and increase the rate of feed through digestive system. The feed consumption of chicken increase, and it finally increased protein consumption.

Effect of FTBPM in The Diet on Average Body Weight Gain, Feed Conversion Ratio, Final Body Weight and Carcass Percentage.

Effect of FTBPM in the diet on average body weight gain, feed conversion ratio, last body weight and carcass percentage was presented in Tabel 4.

Average body weight gain was lower than standard of Arbor Acres for broiler chicken at 6 weeks (1.378g). Analysis of variance showed that FTBPM in the diet significantly increase body weight gain. The lower body weight gain (P<0,05) in this experiment caused by lower feed consumption, due to higher temperature.

The result on the Table 4 shown that FTBPM in the diet significantly (P<0,05) decrease feed conversion. The value of feed conversion higher than AA standard for broiler chicken at 6 weeks old 1.94. This is caused by the quality of another feedstuff for composed of the diet i.e., yellow corn, rice brand and fish meal are not so good. Although, FTBPM having good nutrition value and essay to digest, but cant not cover another feedstuff. Decreasing feed conversion value with increasing FTBPM in the diet, because FTBPM is fermented feedstuff, it will be essay to digest. Consider of Haris and Karmas (1989), Umar *et al.*, (1991), Dina (1999) and Mahfudz *et al.*(1997[a];1999), fermented feedstuff able to increase digestibility that will significantly affected to support feed conversion value.

he used of FTBPM in the diet was significantly (P<0,05) increased final body weight. The last body weight revolve between 1.035 until 1.137g, this result lower than standard of AA for broiler chicken 6 weeks old around 1.890g. The lower last body weight caused by lower feed consumption and body weight gain.

Table 4. Average Body Weight Gain, Feed Conversion Ratio, Final Body Weight and Carcass Percentage of Broiler Chicken During Experimental Period

Parameter	Treatment			
	T0	T1	T2	T3
Body Weight Gain (g)	896,00[a]	963,00[b]	984,00[b]	1.038,00[c]
Feed Conversion	2,21[a]	2,18[b]	2,14[b]	2,03[b]
Final Body Weight (g)	1.035,00[a]	1.082,00[b]	1.103,00[bc]	1.137,00[c]
Carcass Percentage (%)	62,30[a]	63,40[a]	65,10[b]	66,10[b]

Note : Different Superscript on the same is significantly (P<0.05) different

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The used of FTBPM in the diet was significantly (P<0,05) increased final body weight, because the diet quality increase if contain FTBPM, so the diet will be easy to digest and palatable for chicken (Sutardi , 1980; Haris and Karmas, 1989; and Mahfudz, *et al.*, 1999). The increased last body weight by TBPFM, also caused increase feed consumption that was effect of larger body weight. Scott, *et al.* (1982), Anggorodi (1985), Wahyu (1997) and Mahfudz, *et al.* (1996[b] ;1999) stated that feedstuff was fermented will be increased feed consumption, and the finally will be increased gain.

Table 4 shown average broiler chicken carcass around 62,10 ~ 66,13%, this result same with AA standard and Moreng and Evans (1985) for broiler chicken carcass at 6 weeks old around 60 ~ 70%. The statistical analysis, the used of FTBPM in the diet was significantly (P<0,05) increased broiler chicken carcass percentage. Even body weight and final body weight below standard AA, but carcass percentage was normal. This result was explained that TBPFM, has capability to support chicken carcass component growth (meat and bone). Berg and Butterfield (1976); Haris and Karmas (1989); Fardias (1989), Safro *et al.* (1992) and Mahfudz, *et al.* (1996[b];1999; 2000) stated that feedstuff was fermented, the protein quality better than the original feedstuff. Forrest, *at al.*, (1975), Wilson (1980), Moreng and Evans (1985), North and Bell (1990), Anggorodi (1995) and Wahyu (1997) said that protein quality increased caused by fermented feedstuff, and chicken body changed it to meat growth.

CONCLUSION AND SUGGESTION

Conclusion

The use of Tofu By-product Fermentation Meal (TBPFM) has capability to increase feed consumption, body weight gain, carcass percentage and protein efficiency utility, and also decrease feed conversion.

Suggestion

Tofu By-product Fermentation Meal (TBPFM) can be included in the diet of broiler chicken until 20%, with better result and increase feed efficiency.

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