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PERFORMANCE AND CARCASS QUALITY OF MALE BROILER FED VARYING LEVEL OF WHITE TURMERIC (*Curcuma xanthorriza*)

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ABSTRACT

This study was conducted particularly to investigate the effect of various level supplementation of white turmeric meal (WTM) in the diet on overall performance and carcass quality of male broiler. The implication of different diet inclusion levels (1 % and 2 %) of WTM on total feed intake, body weight gain, feed conversion, carcass analysis (slaughter weight, carcass weight, meat weight, weight of abdominal fat, percentage of carcass, and percentage of fat abdominal) of broilers were tested comparing to untreated control birds. A hundred and thirty five male day old broiler chicken were used for a 35 days feeding trial to test the supplementation of WT. There were four different dietary treatments, namely R1S (1.00% WTM, sun dried), R2S (2.00% WTM, sun dried), R1W (1.00% WTM, wind dried), and R2W (2.00% WTM, wind dried). Daily feed consumption and weekly body weight were recorded to get the data of total feed intake (FI), feed conversion ratio (FCR), and body weight gain (BWG). At the 5 week, 1 bird was randomly selected from each of the four dietary treatments. The birds were slaughter by cutting the neck through the jugular vein to determine the carcass parameters. The results showed that supplementation of 2.00% WTM reduce total FI ($P<.05$) and FCR ($P<.05$), but didn't affect BWG in all the treatments. At the other hand, there were also no significant differences among birds raised on diets with WTM supplementation up to hat levels on slaughter weight, carcass weight, meat weight, weight of abdominal fat, percentage of carcass, and percentage of fat abdominal. It was concluded that supplementation of WTM up to 2.00% can be used to increase feed efficiency but can not be used to improve carcass quality.

Key words : Performance, Male broiler, Carcass quality, White turmeric

INTRODUCTION

Current issue on the poultry nutrition in tropical countries is to observe all alternative local feedstuff to improve poultry productivity. Poultry productivity is not separated to the function of feed and nutrient as the most important factor in reaching the best performance. The right amount of nutrient, quality products, and balance ration give significant effects in increasing poultry productivity. Feed additive is the other supported material. Zuprizal (2004) stated that feed additive is non-nutritious raw material which supplemented within the basal diet in a small amount. Hardjosoebroto and Astuti (1993) add that feed additive can also be digested and helps gut to digest the

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ingests. Feed additives give positive effect in helping nutrient absorption and metabolism process.

One of the prospective feed additives which interested to study is phytobiotic from white turmeric. Many researchers reported that phytobiotic from white turmeric increases appetite (so, it can be used as appetizer), repairs condition of the gut, enlarges function of nutrient absorption, etc. In the laboratory scale, Curcumin in the rhizome of white turmeric reduces glucose content in the blood, anti-inflammatory, anti-cancer, and antioxidant. Curcumin also helps absorption and degradation of cholesterol (Arofa, 2005).

Many phytochemicals consist of the rhizome of white turmeric, such as : curcumin, curcuminoid, and volatile oil. Volatile oil containing white turmeric can reduce activity of bacteria, hence parasite in the gut can be localized and reduced. Curcuminoid was reported can increase animal productivity by stimulating bile secretion. Bile secretion is an active compound that is important to enhance digestive process, so nutrient will be easier absorbed (Supriyadi, 2001; Aziz, 2005). Beware on the function of phytobiotic within rhizome of white turmeric, it is nesesary to study more about the use of white turmeric to increase poultry productivity especially on the effect of white turmeric meal supplementation in the diet on male broiler performance.

MATERIALS AND METHODS

Materials.

Materials used in this study were: Day Old Chick Strain of MB 202P produced by PT. Multibreeder Adhirama Indonesia Tbk., commercial ration of BR-1 as basal diet produced by PT. Japfa Comfeed Indonesia Tbk., white turmeric meal, and drinking water. Equipment used were weighing scale, 27 units of individual cages (dimension of 0.9x0.6x0.6 m^3 each) equipped by feed tray and drinking facility, litter, and lamp 60 Watt as brooder.

Methods.

White turmeric meal (WTM) preparation. Rhizome of white turmeric was cleaned to remove any dust and un wanted materials and sliced as thin as possible. All rhizome slices were divided into 2 groups, one group was dried under the sun ray (R1S and R2S) and the other was dried by the wind (R1W and R2W). The dry and sliced was being milled by Hammer Mill with screen diameter of 1mm. The white turmeric meal (WTM) was ready to be composed into treatment diets.

Feeding trial. All broilers were plotted into 5 different treatment group (Table 1). Each group consisted of 3 replications with 5 bird each. The treatment diets were given twice a day (at 7 a.m. and 4 p.m.). Feed and drinking water were offered *ad libitum*.

Data collection. All broilers were raised for 35 days. During feeding trial, feed consumption was calculated everyday and body weight was weighed every week. Feed conversion ratio (FCR) of each group was calculated at the end of the feeding trial.

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Statistical data analyses. All data collected were analyzed by analyses of varian of the Completely Randomized Design and followed by the *Duncan's new Multiple Range Test* for the significant difference means.

Table 1. Raw materials composition of the treatment diet used in the experiment.

Raw materials[1]	Dryaing method (%)				
	Control	Sun dried		Wind dried	
	R0	R1S	R2S	R1W	R2W
Basal diet (BR-1)	98.00	98.00	98.00	98.00	98.00
White turmeric meal (WTM)	0	1.00	2.00	1.00	2.00
Filler (smooth sand)	2.00	1.00	0	1.00	0
Total amount	100.00	100.00	100.00	100.00	100.00

Notes: [1]DM base composition

RESULTS AND DISCUSSION

Performance of Male Broiler

Table 2. shows the effects of WTM supplementation in the ration on the performance were presented in the Table 2.

The feed consumption of the broilers feed basal diet supplemented up to 2.00% WTM was significantly lower (P<.05) than the control diet. WTM supplementation up to that level on both treatments sun dried (516.90 g/head/day) and wind dried (513.43 g/head/day) decreased the feed consumption. In the case of sun dried, feed consumption of R1S (526.72 g/head/day) was not different with R2S (516.90 g/head/day). It means that supplementation of 1.00% was also reducing the feed consumption.

White turmeric contains phytobiotic and several chemical compounds which are important to enhance metabolism process. Beside starch (29-30%), white turmeric also contains curcuminoid (1-2%), volatile oil (6-10%), and others. Starch of white turmeric is easily digested, valuable for growing child, and important for healing diseases. Volatile oil of white turmeric reported can be used as antiseptic and natural antibiotic. Supriadi (2001) stated that this active compound reduces activities of bacteria of Staphylococcus.

Curcuminoid and volatile oil of white turmeric physically and chemically can be used as feed additive to increase animal productivity, quality of products, and general health. Physiologically, these active compounds stimulate secretion of large quantity of bile in the blood, hence increases flow of ingest to duodenum, and enhance nutrient absorption by the small intestine (Aziz, 2005).

Sharma et al. (2005) reported that the animal and human fed with supplementation of white turmeric in the ration shows better condition than those which are not supplemented. Hence, it can be predicted that supplementation of WTM makes digestive and metabolism proceses of the broiler running better Secondly, average daily gain (ADG) of the broilers fed basal diet supplemented by WTM was slightly decreased (Figure 1) from 350.60 g/head/day (R0) to 331.04 g/head/day (R2S) and 332.68 g/head/day (R2W). Statistical analyses shows there were no significant differences between all treatments. Supplementation of WTM up to 2.00% didn't give any effect on ADG of the broiler.

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Table 2. Data of feed consumption, average daily gain, and feed conversion ratio of broilers.

Parameter	Drying method				
	Control	Sun dried		Wind dried	
	R0	R1S	R2S	R1W	R2W
Feed consumption (g/head/day)*	569.51[a]	526.72[bc]	516.90[c]	564.38[a]	513.43[c]
Average Daily Gain (g/head/day)[ns]	350.60	344.42	331.04	347.72	332.68
Feed Conversion Ratio*	1.52[a]	1.48[ab]	1.47[ab]	1.53[a]	1.46[b]

Notes: [a,b,c] Different superscript within one row shows a significant differences (P<.05)
[ns] Non significant

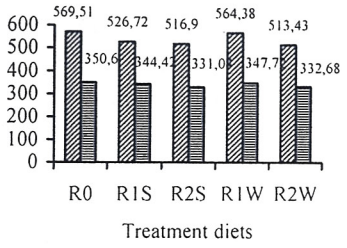

Figure 1. Feed consumption and average daily gain of broiler.

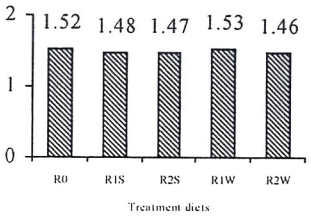

Figure 2. Feed conversion ratio (FCR) of broiler.

Supplementation of WTM up to 2.00% reduce feed consumption without reduceing ADG. That result illustrates that the broilers fed treatment diet (R2S and R2W) consume ration less than those in control diet (R0). There was no significant differences between groups of sun dried (R2S; 331.04 g/head/day) and wind dried (R2W; 332.68 g/head/day). It can be presumed that broiler's diet will be consumed more effectively if supplemented by 2.00% WTM.

The broiler groups which were supplemented by 2.00% WTM (R2W) decrease their FCR (P<.05). WTM supplementation reduced FCR from 1.52 (control diet; R0) to 1.46 (R2W). FCR of the broiler group which was supplemented up to 2.00% by WTM dried under the sun ray (R2S) did not differ with to the control diet of R0. It can be presumed that supplementation up to those level caused the nutrient to be absorbed faster by the gut and converted to be meat better than those without WTM supplementation. Supriyadi (2001) stated that beside stimulates secretion of bile into the blood, active compound within white turmeric can also stimulate pancreatic walls to produce digestive enzymes, such as : amylase, lipase, and protease, which are important in digesting starch, fat, and protein.

A specific active compound (phytobiotic) – curcumin – was a polyphenolic compound derived by the rhizome of white turmeric (*Curcuma xanthorriza*). This phytobiotic is an active compound which has function as an anti-oxidant (Odot et al.,

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2004; Durgaprasad et al., 2005; Shoskes, 2005; Sharma et al., 2005; Arafa, 2005), anti-inflammatory agent (Odot et al., 2004; Holt et al., 2005), anti-cancer in rodent and human (Aggarwal et al., 2003; Nishino et al., 2004; Narayan, 2004; Sharma et al., 2004; Lambert et al., 2005), and repair condition of the animal and human gut (Sharma et al., 2005).

FCR of the broiler group of R2S was different with the group of R2W. The process of drying when the rhizome of white turmeric prepared to be WTM seem caused the difference result between R2S and R2W. When it dried under the sun light, the active compound and the volatile oil was evaporate by heating more compare to those dried by wind. It can be suggested that the wind dried is better in preparing the WTM.

Carcass Quality of Male Broiler

The effects of WTM supplementation up to 2.00% in the ration on carcass quality are reported at the Table 3 below.

Data on the Table 3. above shows that the abdominal fat weight reduced (P<.5) without reduced carcass weight when gave basal diet supplemented by 2.00% WTM. The abdominal fat weight reduced from 51.53 g (R0) to 42.88 g (R2S) and 38.48 g (R2W). It can be predicted that supplementation of WTM caused feed digested better and process of fat deposition depressed than those without WTM supplementation.

Rukmana (1994) reported that white turmeric contains curcumin which can stimulate pancreas to produce enzyme amylase, lipase, and protease much better. As mentioned by Yuwanta (2000), pancreas produces enzyme, which are so important to digest starch, fat, and protein. The presence of WTM in the ration seems stimulate the gland to produce digestion enzymes, hence supplementation up to of 2.00% enlarge it ability to digest starch, fat, and protein. Afterwards, supplementation of WTM reduced abdominal fat weight without reduced carcass weight.

Table 3. The effect of WTM supplementation on carcass quality of broilers used in the study.

Parameter	Feeding Trials				
	Control	Sun dried		Wind dried	
	R0	R1S	R2S	R1W	R2W
Slaughter weight (g)^{ns}	1986.00	1854.33	1953.42	1880.17	1928.00
Carcass weight (g)^{ns}	1384.33	1304.58	1377.00	1318.42	1342.25
Abdominal fat weight (g)*	51.53^{a}	42.78^{b}	42.88^{b}	41.32^{b}	38.48^{c}
Percentage of carcass weight (%)^{ns}	69.69	70.28	70.48	70.13	69.58
Percentage of abdominal fat weight (%)^{ns}	2.59	2.31	2.18	2.20	2.00

Notes: ^{a,b,c} Different superscript within one row shows a significant differences (P<.05)
^{ns} Non significant

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Reducing of the fat abdominal weight without reducing the carcass weight estimated that nutrient in the feed was accumulated as meat, not as fat abdominal. It can be assumed that the feed was consumed more effective.

At the other hand, slaughter weight, percentage of carcass weight and percentage of abdominal fat weight were not affected by supplementation of WTM. Supplementation up to the level was not able to increase slaughter weight and percentage of carcass weight yet. Although those parameter were also affected by the presence of feed additive in the ration (Soeparno, 1998), but supplementation up to the level weren't affected them significantly yet.

REFERENCES

Aggarwal, B. B., A. Kumar, and A. C. Bharti, 2003. Anticancer potential of curcumin: preclinical and clinical studies. Anticancer. Res. Vol. 23(1A):363-98.

Arafa, H. M., 2005. Curcumin attenuates diet-induced hypercholesterolemia in rats. Med. Sci. Monit. Vol. 11(7):BR228-234.

Aziz, N. K. 2005. Riset : Potensi Temulawak dalam Peningkatan Produktivitas Ternak. Majalah Poultry Indonesia. Edisi no 302, hal: 68-69. Juni 2005.

Durgaprasad, S., C. G. Pai, Vasanthkumar, J. F. Alvres, and S. Namitha, 2005. A pilot study of the antioxidant effect of curcumin in tropical pancreatitis. Indian J Med Res. Vol. 122(4):315-8.

Hardjosoebroto, W. dan J.M. Astuti, 1993. Buku Pintar Peternakan. PT. Gramedia, Jakarta.

Holt, P.R., S. Katz, and R. Kirshoff, 2005. Curcumin therapy in inflammatory bowel disease: a pilot study. Dig. Dis. Sci. Vol. 50(11):2191-3.

Lambert, J. D., J. Hong, G. Y. Yang, J. Liao, and C. S. Yang, 2005. Inhibition of carcinogenesis by polyphenols: evidence from laboratory investigations. Am. J. Clin. Nutr. Vol. 81(1 Suppl):284S-291S.

Narayan, S., 2004. Curcumin, a multi-functional chemopreventive agent, blocks growth of colon cancer cells by targeting beta-catenin-mediated transactivation and cell-cell adhesion pathways. J Mol Histol. Vol. 35(3):301-7.

Nishino, H., H. Tokuda, Y. Satomi, M. Masuda, Y. Osaka, S. Yogosawa, S. Wada, X. Y. Mou, J. Takayasu, M. Murakoshi, K. Jinnno, and M. Yano, 2004. Cancer prevention by antioxidants. Biofactors. Vol. 22(1-4):57-61.

Odot, J., P. Albert, A. Carlier, M. Tarpin, J. Devy, and C. Madoulet, 2004. In vitro and in vivo anti-tumoral effect of curcumin against melanoma cells. Int. J. Cancer. Vol. 111(3):381-7.

Sharma, R.A., S.A. Euden, S. L. Platton, D. N. Cooke, A. Shafayat, H.R. Hewitt,T.H. Marczylo, B. Morgan, D. Hemingway, S.M. Plummer, M. Pirmohamed, A. J. Gescher, and W.P. Steward, 2004. Phase I clinical trial of oral curcumin: biomarkers of systemic activity and compliance. Clin Cancer Res. Vo. 10(20):6847-54.

Sharma, R.A., A.J. Gescher, and W.P. Steward, 2005. Curcumin: the story so far. Eur. J. Cancer. Vol. 41(13):1955-68.

Shoskes, D., C. Lapierre, M. Cruz-Corerra, N. Muruve, R. Rosario, B. Fromkin, M. Braun, J. Copley, 2005. Beneficial effects of the bioflavonoids curcumin and

SUPPORTING PAPERS
ISBN 979-97243-9-2

quercetin on early function in cadaveric renal transplantation: a randomized placebo controlled trial. Transplantation. Vol. 80(11):1556-9.

Supriadi. 2001. Penggunaan dan Khasiat Tumbuhan Obat Indonesia. Pustaka Populer, Jakarta.

Zuprizal, 2004. Antibiotik, probiotik, dan fitobiotik dalam pakan unggas. Ilmiah Populer. Majalah Poultry Indonesia. Edisi No. 284, Januari 2004, Jakarta.