Short Communication

INFLUENCE OF DIFFERENT LEVELS OF ENERGY AND PROTEIN ON MUSCLE PROTEIN CONTENT OF BROILERS REARED IN ENVIRONMENTALLY CONTROLLED AND OPEN SIDED HOUSING SYSTEM

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ABSTRACT

An experiment was conducted by feeding diets with different levels of energy (2850, 2950 and 3050 kcal/kg in pre-starter diet, 2950, 3050 and 3150 kcal/kg in starter diet and 3050, 3150 and 3250 kcal/kg in finisher diet) and protein (21.5, 22.5 and 23.5% in pre-starter diet, 20.5, 21.5 and 22.5% in starter diet and 19, 20 and 21% in finisher diet) to commercial broilers for a period of five weeksto assess the muscle protein content in environmentally controlled and open sided housing system. The interaction between feeding different levels of energy and protein and housing system revealed no significant influence on breast and thigh muscle protein level in broilers.

Key words: Energy, Protein, Muscle protein, Broilers.

Broiler production in tropical countries like India faces many challenges which results in lower production performance of broilers. One of the major challenges is the fluctuations in poultry house temperature and relative humidity especially on higher side. The detrimental effects of high ambient temperature on feed intake, growth rate and feed efficiency of broilers are well documented (Hacina *et al.,* 1996). Environmentally controlled housing system paves way to overcome the ill effects of climatic variation inside the poultry house.Prevailing conditions of increasing ambient temperature and the system of rearing in tropical countries are the major concern in broiler production.

The future of broiler industry may increasingly depend on environmentally controlled poultry house rather than open sided poultry house, due to conditions like

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global warming. Protein having major effect on growth performance of the bird and is also the most expensive nutrient in broiler diets apart from energy (Kamran *et al.,* 2004).

The experiment was conducted with five hundred and seventy six (each 288 in environmentally controlled deep litter house and open sided deep litter house), sex separated, day-old, commercial broiler chicks belonging to single hatch. The chicks were wing banded, weighed and randomly allotted into nine treatment groups with four replicates of eight chicks each under both open and environmentally controlled housing systems. In environmentally controlled house, the brooding temperature was set at 33^{o} C on the first day and gradually reduced to 27 ^{0}C on 10^{th} day and the same temperature was maintained till the end of the experiment. The humidity was set at 65 per cent from day one to 5 weeks of age. The treatment groups of the experiment were given in Table1.

At the end of the experimental period (35^{th} day), four males and four females, totally eight birds from each treatment group were randomly selected and slaughtered as per the method of Arumugam and Panda (1970). The breast and thigh muscle samples were collected for protein estimation. The muscle samples were analyzed for protein content as per the standard procedure AOAC (2002). The collected data were subjected to statistical analysis as per the method suggested by Snedecor and Cochran (1989). Angular transformation was applied to percentages wherever needed before carrying out statistical analysis.

The mean (± S.E.) breast and thigh muscle protein content (per cent) of broilers at 5 weeks of age as influenced by different levels of energy and protein and their interaction with housing system are presented in Table 2.

In environmentally controlled housing system, mean breast and thigh muscle protein of broilers revealed a significant difference (P<0.05) between treatment groups. The highest breast muscle protein (21.65%) and thigh muscle protein (21.53%) were recorded in group T3. The T7 group recorded the lowest breast and thigh muscle protein (19.65 and 19.21 %) in broilers.

Mean breast and thigh muscle protein of broilers reared in open sided housing system revealed a significant difference (P<0.05) between treatment groups. The highest breast and thigh muscle protein was recorded in T9 group (22.65 and 22.15 %). The lowest breast and thigh muscle protein was recorded in T1 group (20.01 and 19.36%).

The interaction between feeding different levels of energy and protein and housing system revealed no significant influence on breast and thigh muscle protein level in broilers.

The above findings concur with findings of Bregendahl *et al.* (2002), Gu *et al.* (2008) and Marcu *et al.* (2013) who also reported that energy and protein level in feed does not have any significance in muscle protein level of broilers.

Table 1. Energy protein content of treatment diets

Type of feed & number of birds	Treatments																	
	T1		T2		T_3		T_4		T5		T6		T7		T8		T9	
	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)	CP (%)	ME (kcal/kg)
Pre-starter	21.5	2850	22.5	2850	23.5	2850	21.5	2950	22.5	2950	23.5	2950	21.5	3050	22.5	3050	23.5	3050
Starter	20.5	2950	21.5	2950	22.5	2950	20.5	3050	21.5	3050	22.5	3050	20.5	3150	21.5	3150	22.5	3150
Finisher	19.0	3050	20.0	3050	21.0	3050	19.0	3150	20.0	3150	21.0	3150	19.0	3250	20.0	3250	21.0	3250
Number of birds per treatment	4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds		4 replicates X 8 = 32 birds	

Table 2. Mean (± S. E.) muscle protein content (%) of broilers reared in environmentally controlled and open sided housing system at five weeks of age as influenced by different levels of energy and protein and housing system

Treatment	Environmentally controlled housing system		Open sided housing system		't' value A Vs C	t – value A Vs D
	Breast muscle protein (A)	Thigh muscle protein (B)	Breast muscle protein (C)	Thigh muscle protein (D)		
T_1 (LP-LE)	$21.25^{a} \pm 0.26$	$20.98^{a} \pm 0.23$	$20.01^{b} \pm 0.25$	$19.36^{b} \pm 0.15$	1.09^{NS}	1.02^{NS}
T_2 (MP-LE)	$20.35^{bc} \pm 0.15$	$20.12^{bc} \pm 0.30$	$22.06^{a} \pm 0.29$	$21.96^{a} \pm 0.25$	0.98^{NS}	0.45^{NS}
T_3 (HP-LE)	$21.65^{a} \pm 0.14$	$21.53^{a} \pm 0.22$	$20.10^{b} \pm 0.18$	$19.85^{b} \pm 0.22$	1.21^{NS}	0.31^{NS}
T_4 (LP-ME)	$19.89^{c} \pm 0.25$	$19.65^{c} \pm 0.18$	$21.99^{a} \pm 0.24$	$20.98^{a} \pm 0.24$	1.05^{NS}	0.98^{NS}
T_5 (MP-ME)	$20.89^{b} \pm 0.28$	$20.55^{abc} \pm 0.10$	$22.42^{a} \pm 0.26$	$21.22^{a} \pm 0.18$	1.55^{NS}	1.02^{NS}
T_6 (HP-ME)	$20.16^{bc} \pm 0.18$	$20.30^{bc} \pm 0.22$	$20.14^{b} \pm 0.19$	$20.01^{b} \pm 0.10$	1.69^{NS}	0.29^{NS}
T_7 (LP-HE)	$19.65^{c} \pm 0.22$	$19.21^{c} \pm 0.28$	$20.51^{b} \pm 0.22$	$20.22^{b} \pm 0.18$	0.65^{NS}	0.12^{NS}
T_8 (MP-HE)	$20.24^{b} \pm 0.22$	$19.99^{b} \pm 0.16$	$22.59^{a} \pm 0.19$	$19.65^{b} \pm 0.28$	1.98^{NS}	1.85^{NS}
T_9 (HP-HE)	$20.45^{b} \pm 0.19$	$20.44^{abc} \pm 0.21$	$22.65^{a} \pm 0.28$	$22.15^{a} \pm 0.24$	1.58^{NS}	0.97^{NS}

LP – Low protein; MP – Medium Protein; HP – High protein
LE – Low energy; ME – Medium energy; HE – High energy
Value given in each cell is the mean of 8 observations
$^{a-c}$ Means within a column with no common superscript differ significantly ($P < 0.05$)

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