



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(11): 1140-1142
© 2022 TPI
www.thepharmajournal.com
Received: 08-08-2022
Accepted: 13-09-2022

Rajendran K
Ph.D., Assistant Professor,
Department of Poultry Science,
Veterinary College and Research
Institute, Namakkal,
Tamil Nadu, India

Vasanthakumar T
Ph.D., Assistant Professor,
Department of Poultry Science,
Veterinary College and Research
Institute, Namakkal,
Tamil Nadu, India

Kathirvelan C
Assistant Professor,
Department of Animal
Nutrition, Veterinary College
and Research Institute,
Namakkal, Tamil Nadu, India

Kavitha R
Ph.D., Assistant Professor,
Animal Feed Analytical and
Quality Assurance Laboratory,
Veterinary College and Research
Institute, Namakkal,
Tamil Nadu, India

Shamsudeen P
Ph.D., Professor, Department of
Poultry Management, College of
Poultry Production and
Management, Hosur,
Tamil Nadu, India

Santhi D
Ph.D., Assistant Professor,
Livestock Farm Complex,
Veterinary College and Research
Institute, Orathanad,
Tamil Nadu, India

Corresponding Author:
Rajendran K
Ph.D., Assistant Professor,
Department of Poultry Science,
Veterinary College and Research
Institute, Namakkal,
Tamil Nadu, India

Influence of different levels of lysine and methionine on the muscle protein content of broilers reared in different systems of housing

Rajendran K, Vasanthakumar T, Kathirvelan C, Kavitha R, Shamsudeen P and Santhi D

Abstract

An experiment was conducted by feeding diets with different levels of lysine (1.20, 1.30 and 1.40% in pre-starter diet, 1.10, 1.20 and 1.30% in starter diet and 0.95, 1.05 and 1.15% in finisher diet) and methionine (0.45, 0.55 and 0.65% in pre-starter diet, 0.40, 0.50 and 0.60% in starter diet and 0.35, 0.45 and 0.55% in finisher diet) to commercial broilers for a period of five weeks to assess the muscle protein content in environmentally controlled and open sided housing system. The interaction between feeding different levels of lysine and methionine and housing system revealed no significant influence on breast and thigh muscle protein level in broilers.

Keywords: Lysine, methionine, muscle protein, broilers

Introduction

Indian broiler industry has gone through tremendous development and expansion during the last two decades. It is very well recognized that feed represents the major significant cost in broiler production which ranges from 60 - 80% of the production cost. Lysine and methionine are the two limiting amino acids in corn and soybean meal based broiler diets which may influence the growth of broiler chicken. A right proportion of these nutrients are essential to ensure maximum utilization of all nutrients for optimum growth of broilers. Increased genetic potential of broilers coupled with higher placements helped in rapid development of broiler production in hot climates and requires greater emphasis on finding solutions to alleviate growth depression due to heat stress. Ambient temperature is an important determinant of bird performance. The main consequence of heat exposure is reduction in feed intake in order to reduce metabolic heat production. In broilers this reduction is approximately 1.5 to 2.5 per cent per °C increase in ambient temperature above 20 °C. Environmentally controlled housing system pave way to overcome the ill effects of climatic variation inside the poultry house and also for easy operation and exploiting the maximum genetic potential of the broilers.

Materials and Methods

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 °C on the first day and gradually reduced to 27 °C on 10th 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 table-1.

Table 1: The treatment groups of the experiment

Treatment groups for each system of rearing	Particulars			Number of replicates per treatment	Number of birds per replicate	Total number of birds per treatment
	Type of feed	Lysine (%)	Methionine (%)			
T ₁	Pre-starter	1.20	0.45	4	8	32
	Starter	1.10	0.40			
	Finisher	0.95	0.35			
T ₂	Pre-starter	1.30	0.45	4	8	32
	Starter	1.20	0.40			
	Finisher	1.05	0.35			
T ₃	Pre-starter	1.40	0.45	4	8	32
	Starter	1.30	0.40			
	Finisher	1.15	0.35			
T ₄	Pre-starter	1.20	0.55	4	8	32
	Starter	1.10	0.50			
	Finisher	0.95	0.45			
T ₅	Pre-starter	1.30	0.55	4	8	32
	Starter	1.20	0.50			
	Finisher	1.05	0.45			
T ₆	Pre-starter	1.40	0.55	4	8	32
	Starter	1.30	0.50			
	Finisher	1.15	0.45			
T ₇	Pre-starter	1.20	0.65	4	8	32
	Starter	1.10	0.60			
	Finisher	0.95	0.55			
T ₈	Pre-starter	1.30	0.65	4	8	32
	Starter	1.20	0.60			
	Finisher	1.05	0.55			
T ₉	Pre-starter	1.40	0.65	4	8	32
	Starter	1.30	0.60			
	Finisher	1.15	0.55			
Total						288

At the end of the experimental period (35th day), four males and four females, totally eight birds from each treatment group were randomly selected and were slaughtered as per the method of Arumugam and Panda (1970) [2] and the breast and thigh muscle samples were collected for protein estimation. The muscle samples were analyzed for protein content as per the standard procedure A.O.A.C. (2002) [1]. The collected data were subjected to statistical analysis as per the method suggested by Snedecor and Cochran (1989) [6]. Angular transformation was applied to percentages wherever needed before carrying out statistical analysis.

Results and Discussion

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 lysine and methionine and their interaction with housing system are presented in Table 2 and 3,

respectively.

In environmentally controlled housing system, highest breast muscle protein (23.62%) and thigh muscle protein (22.01%) were recorded in group T₉. The T₃ group recorded the lowest breast and thigh muscle protein (20.32 and 20.05%) in broilers. The other groups recorded an intermediate values and similar trend was noticed in open sided housing system. The result revealed that in both the housing system, dietary lysine and methionine had a significant ($P < 0.05$) influence on breast and thigh muscle protein. The interaction between feeding different levels of lysine and methionine and housing system showed no significant influence on breast and thigh muscle protein level in broilers. The muscle protein content was higher in the T₉ group which might be due feeding of broilers with more amount of the limiting amino acids lysine and methionine.

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

Treatment groups	Environmentally controlled housing system		Open sided housing system	
	Breast muscle protein	Thigh muscle protein	Breast muscle protein	Thigh muscle protein
T ₁	22.72 ^b ± 0.24	21.56 ^{abc} ± 0.34	22.41 ^a ± 0.31	20.96 ^{abc} ± 0.38
T ₂	21.59 ^{de} ± 0.29	20.94 ^{cd} ± 0.48	20.46 ^b ± 0.29	20.36 ^{cd} ± 0.42
T ₃	20.32 ^e ± 0.20	20.05 ^d ± 0.29	20.18 ^b ± 0.21	20.06 ^d ± 0.32
T ₄	22.87 ^a ± 0.09	21.79 ^a ± 0.33	21.98 ^a ± 0.23	20.98 ^{abc} ± 0.46
T ₅	21.89 ^b ± 0.22	21.62 ^{abc} ± 0.45	22.56 ^a ± 0.15	21.52 ^{abc} ± 0.38
T ₆	21.58 ^c ± 0.16	21.05 ^{bcd} ± 0.16	21.05 ^b ± 0.29	21.02 ^{bcd} ± 0.12
T ₇	20.89 ^{cd} ± 0.25	20.47 ^{cd} ± 0.29	20.79 ^b ± 0.30	21.25 ^{bcd} ± 0.24
T ₈	22.65 ^b ± 0.18	21.21 ^{ab} ± 0.22	22.68 ^a ± 0.19	22.11 ^{ab} ± 0.34
T ₉	23.62 ^a ± 0.22	22.01 ^a ± 0.35	22.78 ^a ± 0.29	22.42 ^a ± 0.29

Value given in each cell is the mean of 8 observations

^{a-e} Means within a column with no common superscript differ significantly ($p < 0.05$)

Table 3: Effect of housing system on mean (\pm S. E.) muscle protein content (%) of broilers at five weeks of age as influenced by different levels of lysine and methionine

Treatment groups	Breast muscle protein (%)			Thigh muscle protein (%)		
	EC	OPHS	't' value	EC	OPHS	't' value
T ₁	22.72 \pm 0.24	22.41 \pm 0.31	1.28 ^{NS}	21.56 \pm 0.34	20.96 \pm 0.38	1.09 ^{NS}
T ₂	21.59 \pm 0.29	20.46 \pm 0.29	1.08 ^{NS}	20.94 \pm 0.48	20.36 \pm 0.42	0.66 ^{NS}
T ₃	20.32 \pm 0.20	20.18 \pm 0.21	1.92 ^{NS}	20.05 \pm 0.29	20.06 \pm 0.32	0.49 ^{NS}
T ₄	22.87 \pm 0.09	21.98 \pm 0.23	1.30 ^{NS}	21.79 \pm 0.33	20.98 \pm 0.46	0.69 ^{NS}
T ₅	21.89 \pm 0.22	22.56 \pm 0.15	1.19 ^{NS}	21.62 \pm 0.45	21.52 \pm 0.38	0.72 ^{NS}
T ₆	21.58 \pm 0.16	21.05 \pm 0.29	1.92 ^{NS}	21.05 \pm 0.16	21.02 \pm 0.12	0.29 ^{NS}
T ₇	20.89 \pm 0.25	20.79 \pm 0.30	2.09 ^{NS}	20.47 \pm 0.29	21.25 \pm 0.24	0.19 ^{NS}
T ₈	22.65 \pm 0.18	22.68 \pm 0.19	0.42 ^{NS}	21.21 \pm 0.22	22.11 \pm 0.34	0.55 ^{NS}
T ₉	23.62 \pm 0.22	22.78 \pm 0.29	0.55 ^{NS}	22.01 \pm 0.35	22.42 \pm 0.29	0.69 ^{NS}

OPHS - Open sided housing system, EC- Environmentally controlled housing system.

NS- Non significant

The above findings concur with findings of Bregendahl *et al.* (2002)^[3], Gu *et al.* (2008)^[4] and Marcu *et al.* (2013)^[5].

Conclusion

Mean breast and thigh muscle protein of broilers in both environmentally controlled and open sided housing system showed significant ($P < 0.05$) difference due to dietary levels between treatment groups. The highest breast muscle protein and thigh muscle protein were recorded in group T₉ in both environmentally controlled and open sided housing system. The interaction between feeding different levels of lysine and methionine and housing system showed no significant influence on breast and thigh muscle protein level in broilers.

Reference

1. AOAC. Official Methods of Analysis. 17th ed., Association of Official Analytical Chemists, Benjamin Franklin Station, Washington, D.C.; c2002.
2. Arumugam MP, Panda B. Processing and inspection of poultry. Indian Veterinary Research Institute, Izatnagar, U.P.; c1970.
3. Bregendahl K, Sell JL, Zimmerman DR. Effect of low protein diets on growth performance and body composition of broiler chicks. Poultry Science. 2002;81:1156-1167.
4. Gu XH, Li SS, Lin H. Effects of hot environment and dietary protein level on growth performance and meat quality of broiler chickens. Asian-Australian Journal of Animal Science. 2008;11:1616-1623.
5. Marcu A, Vacaru-opris I, Dumitrescu G, Marcu A, Ciochina LP, Nicula M, *et al.* Effect of diets with different energy and protein levels on breast muscles characteristic of broiler chickens. Animal Science Biotechnology. 2013;46(1):256-260.
6. Snedacor GW, Cochran WG. Statistical methods, (8th edn.) Iowa state University Press, Ames, Iowa; c1989. p. xx+503