

EVALUATION OF GROWTH PERFORMANCE OF BROILER (COBB-400) UNDER DIFFERENT COMPOSITION OF DIETS

RISHIKESH PATHAK¹, NAZIM ALI¹, SHALU KUMAR^{2*} AND HARENDRA SINGH CHAUHAN¹

¹Department of Animal Husbandry and Dairy Science,

Sardar Vallabhbhai Patel University of Agriculture and Technology Meerut - 250 110 (INDIA)

²Dr. B.S.Konkan Kirshi Vidyapeeth Dapoli, Maharashtra - 415 712 (INDIA)

e-mail: shalukumar18@rediffmail.com

KEYWORDS

Broiler chick
Feed consumption
Body weight gain
Feed conversion
Ratio

Received on :
08.12.2014

Accepted on :
19.09.2015

***Corresponding
author**

ABSTRACT

The present experiment was conducted at Sardar Vallabhbhai Patel University of Agriculture and Technology Meerut to determine the growth performance of 40 broiler chicks after feeding them on four different dietary protein levels. All the birds were fed basal diets and in treatment group, birds were further supplemented with 24, 20 and 18 % different protein diets. Experiment was conducted for 42 days. Birds that fed different composition of diets show the significant ($p < 0.05$) effect on feed intake, body weight gain and feed conversion ratio. Thus, the results show that the different dietary protein level having a significant effect on the growth performance of the broiler chicken.

INTRODUCTION

Feed is a major component, affecting net return from the poultry because cost of the feed accounts about 65 to 70 % for broiler production and is a major factor which affects the production cost (Srivastava *et al.*, 2013). In India there is a huge gap between demand and availability of poultry feeds in general and energy feeds in particular. The unusually high price of grains has forced on the poultry farmers to search their substitutes *i.e.* traditionally groundnut cake, fish meal, wheat and maize grain. Maize is used as a main energy source in poultry diets but it is costly (Raman *et al.*, 2010). The energy content of feeds like groundnut cake, maize and wheat can be increased by various processing techniques like grinding, cooking and reconstitution. The seed is quite digestible and palatability; which gives more energy than cereals on equal weight basis when fed to the flock (Neshein *et al.*, 1979). Blood meal is a dark chocolate-coloured powder. It is one of the richest sources of lysine, a rich source of arginine, methionine cystine, leucine but is very poor in isoleucine and contain less glycine than either fish meal or bone meal (NRC, 1994). Cotton is the second best protein-producing plant in the world after soybean and the seeds of cotton are potentially a valuable feed for poultry. Dietary protein is a major source of body protein. Poor quality or imbalanced protein can create metabolic stress which reduced growth performance. Protein enhances muscle building and vitamins A, D and E supplements will prevent the deficiency diseases, reduce stress and mortality rate (Swain and Johri, 2000; Sahin *et al.*, 2001

and Wijten *et al.*, 2010). Supplementation of protein and vitamins A, D and E with other feed increases feed intake, total digestibility and feed conversion ratio resulting an increase in daily weight gain as well as significantly increase growth rate of broiler which helps early gain of marketing age that is very important for profitable farming (Odunsi *et al.*, 1999). Although several scientist have stated different concentration of proteins for maximum growth in broilers (Serafin, 1982; Sinha and Verma, 1984; Rajini *et al.*, 1998 and Urdaneta and Leeson 2004). The present study was thus undertaken to evaluate the growth performance of broiler chicken fed with different composition of diets.

MATERIALS AND METHODS

Experimental site, birds, housing and management

The experiment was carried out at poultry unit of integrated farming system research project situated of Sardar Vallabhbhai Patel University of Agriculture and Technology Meerut, Uttar Pradesh, India during December 10, 2013 to January 21, 2014. A total of 40 unsexed day-old Cobb broiler chicks were procured from Venky's Hatchery (Meerut), weighed individually and distributed randomly into four groups each group having 10 chicks. The chicks were reared under hover brooder from two week and thereafter shifted into deep litter system and all birds were reared under standard management practices and necessary health care measures were adopted till 42 days of experiment. Rice husk was used as litter material. The group one birds (T₁) were fed control diet containing

crude protein (CP) 22 % procured from Raja Fat and Feed Pvt. Ltd. (India). In rest three group changes in basal diet were made by replacing some basal diet with other feed forms. Group T₂, T₃ and T₄ birds were fed with 24.00, 20.00 and 18% crude protein consisting of 94.29% control diet + 2.85% blood meal (BM) + 2.85% soya bean meal (SBM), 88.57% control diet + 5.71 % musturd cake + 5.71 % cotton seed and 77.14 % control diet + 11.43% maize + 11.43% groundnut cake (GNC), respectively. They were analysed and formulated to have comparable protein and energy contents to meet design requirements (AOAC, 1990). Above mentioned ration were offered daily in the morning and evening in individual pen up to 6 week age. The experimental diets and drinking water were provided *ad libitum*. Chicks were vaccinated against *Ranikhet* and *Gumboro* disease during the first week and at 18 days of age, respectively through the eyes and drinking water. Wood shavings were poured on the floor two days before the arrival of the chicks. On arrival, clean water with glucose was served them as anti-stress. The initial weights were taken and recorded on arrival and sources of heat put on in the brooder house. They were fed twice daily, in the morning by 8 a.m. and evening by 5.30 p.m. and all vaccination scheduled was observed, the litter material were replaced after the brooding stage and the sanitary/bio-security was also maintained.

Data Collection and Statistical Analysis

The growth performance of broilers was evaluated by recording body weight gain, feed intake, and feed conversion ratio. Average feed intake, feed conversion ratio (FCR) and body weight gain of birds, was recorded. Above parameters was measured weekly using the following Formula: The individual body weight of per replicate was recorded at weekly intervals with electronic balance. Feed intake kg/bird = Feed consumption in a replication/No. of live birds in a replication (Ghazi *et al.*, 2012). The feed conversion ratio was derived by dividing the dry matter of feed consumed with weekly body weight gain (Kumar *et al.*, 2009). Feeds were analysed for proximate principles (AOAC, 1990). Analysis of variance was used for interpretation of data (Snedecor and Cochran, 1994). The data were subjected to statistical analysis under completely randomized design employing one way analysis of variance

RESULTS AND DISCUSSION

Chemical composition of experimental diets

The chemical composition of the experimental diets is presented in Table 1. The broiler starter diets and broiler finisher diets having crude protein values 22.00 to 19.00%, respectively. The crude fibre values of 5.00% for starter broilers and 5.00% also for finisher broilers were recorded for the commercial feeds. According to Obioha (1992), the recommended CP and CF values for starter broilers are respectively 22.00%, 5.00% and 20.00%, 5.5 %, respectively for finisher broilers.

Feed intake of broiler chicks

The average feed intake capacity of birds during the whole experimental period up to 6 week fed diet were found 3721.60 ± 10, 4248.60 ± 6.0, 3403.90 ± 6.7 and

3271.50 ± 7.4 g, respectively (Table 2). The highest feed consumption was reported by the broiler chicks fed diet T₂ and lowest feed consumption by the broiler chicks fed diet T₄, which could be inversely related to energy content of the diet T₁ (22%) and T₃ (20%). This may be due to that highest energy content was in diet T₄ and lowest crude protein value 18.00% and lowest energy content was in diet T₂ and highest crude protein value 24.00%. Since birds first take feed to satisfy their energy, demand once their energy requirement satisfied, they stop feeding. Kavitha, *et al.* (2003) observed that the average feed consumption ranged from 3570.40 to 3865.00 g per chick fed different diets, while average value of feed consumption in present study was 3699.92 ± 13.83 g which is in between the above value. Hence our results are in agreement with above study. The feed consumption up to 6 week, ranged from 3271.50 ± 7.4 g (T₄) to 4248.60 ± 6.0 g (T₂), there are significant differences (p < 0.05) in feed consumption of broiler chicks among different treatment of diet fed to broiler chickens. Grover, *et al.* (2010) reported the average feed consumption during 0-6 week of age for commercial broiler ranged from 2506.0 to 2812.0 g. The average feed consumption was lower than present investigation. This may be due to effect of strain of broilers used in experiment and further may be due to effect of diet composition. Shashipal *et al.* (2010) reported average feed consumption up to 6 week of ranges from 3445.40 to 3483.0 g per chicks with average value 3460.96 g. Although feed intake value in present investigation for the T₁, T₃ and T₄ group is slightly lower than the value of feed consumption was reported by Shashipal *et al.* (2010), but average value feed consumption is slightly higher this is due to higher feed consumption in present study for the T₂. Kumar *et al.* (2015) reported average feed consumption ranged from 3395.80 to 4243.90 g per chick fed different diets, while average value of feed consumption in present study was 3661.4 ± 7.681 g which is in between the above value. Hence our results are in agreement with above study.

Body weight gain of starter/finisher broilers

The average body weight of day old chicks under different treatments were 35.4 ± 0.90, 35.1 ± 1.17, 36.5 ± 1.09 and 36.4 ± 0.90 g for the group T₁, T₂, T₃ and T₄, respectively. There were no significant difference (P > 0.05) was observed among each group. Sharma (1990) and Kumar *et al.* (2015) also reported that the average weight of day old chicks did not differ significantly.

Average body weight gain of broiler chicks up to 6 week of age for the group fed diet T₁, T₂, T₃ and T₄ was found 2065.60 ± 2.26, 2178.70 ± 3.01, 1833.30 ± 1.92 and

Table 1: Composition of experimental diets (kg/100 kg feed)

S.N.	Chemical constituents	Starter diet (%)	Finisher diet (%)
1.	Crude protein	22.00	19.00
2.	Moisture	12.00	12.00
3.	Crude fibre	5.00	5.00
4.	Dry matter	88.00	88.00
5.	Total fat	5.00	5.00
6.	Ash	7.00	7.00
7.	Calcium	0.90	0.90
8.	Phosphorus	0.60	0.60

Table 2: Average feed consumption pattern, body weight gain and feed conversion ratio in (g) by chick broilers up to 6 week of age

Treatments	Parameters Feed intake (g)	Body weight gain (g)	Feed conversion ratio (g)
T ₁ (22% CP) Control	3721.60 ± 10.50	2065.60 ± 2.26	1.79 ± 0.006
T ₂ (24% CP)	4248.60 ± 6.01	2178.70 ± 3.01	1.94 ± 0.005
T ₃ (20% CP)	3403.90 ± 6.73	1833.30 ± 1.95	1.85 ± 0.003
T ₄ (18% CP)	3271.50 ± 7.47	1794.20 ± 5.07	1.81 ± 0.003
Average	3661.40 ± 7.68	1967.95 ± 3.07	1.85 ± 0.004

1794.20 ± 5.07 g, respectively. The overall average body weight gains for T₁, T₂, T₃ and T₄ was 1967.95 ± 3.07 g. Table.2 also showed that body weight up to 6 week ranged from 1794.20 ± 5.07 g (T₄) to 2178.70 ± 3.01 g (T₂), significant differences (P < 0.05) exist in body weight gain of broiler chicks among different treatments of diet fed to broiler chickens. Overall body weight gain up to 6 week of age was higher for the group fed diet T₂. Since there was inclusion of BM in diet T₂, the growth increase may be due to inclusion blood meal. Khawaja *et al.* (2007) reported that inclusion of blood meal in diet increased daily body weight gain from 0-42 days significantly. Shashipal *et al.* (2010) observed body weight gain ranged from 1898.02 to 1920.38 g. Average body weight gain from 0-6 week's age was 1907.30 g per day. In present investigation the average body weight gain up to 6 weeks of age 1972.95 ± 4.00 g was slightly higher. This difference can be contributed due to difference in their genetic constitution. Grover, *et al.* (2010) reported that average body weight gain was ranged from 1280.00 to 1440.00 g during 0-6 week of age. These values were lower than present investigation which may be due to variation in dietary ingredient and due to genetically potential of chick strain use for broiler production. Kavitha *et al.* (2003) conducted experiment on growth performance of broiler, body weight gain was reported from 1338.07 to 1791.07 g during 0-6 weeks of age with average weight gain was 1774.53 g. Kumar *et al.* (2015) reported average body weight gain of broiler chicks upto 6 week of age for the group fed diet T₁, T₂, T₃ and T₄ was found 2174.20 ± 4.87, 1875.40 ± 3.97, 1780.20 ± 2.83 and 2062.0 ± 4.07 g, respectively and average body weight ranged from 1780.20 ± 2.83 g (T₃) to 2174.20 ± 4.87 g (T₁) upto 6 week of age. Overall average body weight gains for T₁, T₂, T₃ and T₄ was 1972.95 ± 4.00 g. It is slightly higher than present investigation which consists of 1967.95 ± 3.07 g. Mean value was lower than present investigation (1972.95 ± 4.00 g). This difference can be contributed by genetically potential of chicks.

The Average feed conversion ratios of diet T₁, T₂, T₃ and T₄ were 1.797 ± 0.006, 1.946 ± 0.005, 1.852 ± 0.003 and 1.817 ± 0.003 g, respectively. The average cumulative FCR was lowest on the diet T₁ (control diet having 22 per cent crude protein) and highest in T₂ (having 24 per cent crude protein [94.29 per cent control diet + 2.85 per cent BM + 2.85 per cent SBM]). There were significant (P < 0.05) difference observed between T₂ (1.946 ± 0.0) and T₁ (1.797 ± 0.0), T₃ (1.852 ± 0.0) and T₄ (1.797 ± 0.0). Feed conversion ratios ranged from 1.797 ± 0.006 to 1.946 ± 0.005 g. overall average feed conversion ratio for T₁, T₂, T₃ and T₄ diet was 1.853 ± 0.004 g up to 6 week of age. Overall FCR upto 6

week of age was higher for the group fed with diet T₂. Since diet T₂ contained blood meal (BM) higher growth may be due to blood meal. Kavitha, *et al.* (2003) reported feed conversion efficiency of different diet fed to broiler chicks upto 6 week of age ranged from 2.03 to 2.14. Average feed conversion ratio for growing chicks was varies from 2.03 to 2.28 as also reported by Raman *et al.* (2010). In present investigation average value of feed conversion ratio ranged from 1.797 to 1.946, which are lower than reported by above scientist. This difference may be due to difference in composition of diet or it may be due to genetic improvement in chicks. Kumar (2015) also reported average FCR upto 6 week ranged from 1.757 ± 0.07 g (T₁) to 1.945 ± 0.00 g (T₂). Overall average body weight gains for T₁, T₂, T₃ and T₄ were 1.85 ± 0.02 g. This is in between the above value. Hence our results are in agreement with above study.

REFERENCES

- Anwar, M. S., Khan, M. Z., Javed, I., Khan, A. and Saleem, M. K. 2008. Pathological effects of cottonseed meal with and without ferrous sulphate in male Japanese quails (*Coturnix Japonica*). *Pakistan Veterinary Journal*. **28(2)**: 51-56.
- AOAC 1990. *Official methods of analysis*. Association of official analytical chemists, Washington, DC.
- Ghazizadeh, A. M., Zohair, G., Al-Maktari, A. and Mohamed, M. A. 2012. A comparative effect of mash and pellet feed on broiler performance and Ascites at high altitude. *Global Veterinaria*. **9(2)**: 154-159.
- Grover, R., Sethi, A. P. S. and Sikka, S. S. 2010. Response of herb jiwanti (*Leptidiniareticulata*) on growth performance and nutrient utilization in commercial broilers. *Indian J. Animal Nutrition*. **27**: 169-173.
- Kavitha, P., Ramana, J. V., Prasad, R. J., Reddy, P. S. and Reddy, P. V. S. 2003. Inclusion of dried tomato (*Lycopersicon esculentum*) pomace in broiler diets on growth performance and carcass characteristics. *Indian J. Animal Nutrition*. **20**: 436-442.
- Khawaja, T., Khan, S. H. and Ansari, N. N. 2007. Effect of different levels of blood meal on broiler performance during two phase of growth. *Int. J. Poultry Science* **6(12)**: 860-865.
- Kumar, P., Ali, N., Rajkumar, Kumar, J., Bansala, M. K. and Kumar, P. 2015. Effect of different dietary protein level on the growth performance of broiler chickens. *Progressive Research An. Int. J.* **10(2)**: 157-15.
- Kumar, S., Singh, P. K., Prasad, A. and Chanramoni, S. 2009. Effect of graded level of dietary energy and protein on the growth performance of cockerels. *Indian J. Anim. Nutr.* **26(1)**: 86-89.
- Laudadio, V., Tufarelli, V., Dario, M., D'Emilio, F. P. and Vicenti, A. 2009. Growth performance and carcass characteristics of female turkeys as affected by feeding programs. *Poultry Science*. **88**: 805-810.
- McDonald, P., Edwards and Greenhalgh, J. F. D. 1992. Animal

Nurtition. 4th Ed. *Published in the United States with J. Wiley and Sons. Inc Newyark*, pp. 455-483

- Moumeni, T. 2001.** Herbal extracts, Farhad Reza Publication, 382
- NRC 1994.** Nutrient requirement for poultry. 9th Ed. National Academy Press. *Washington DC, USA.*
- Obioha, F. C. 1992.** A guide to poultry production in the tropics. Acne Publishers. *Enugu, Nigeria.*
- Odunsi, A. A., Onifade, A. A. and Babatunde, G. M. 1999.** Response of broiler chicks to virginimycin and dietary protein concentrations in the humid tropics. *Archivosdezootecnia.* **48(183):** 317-325.
- Odunsi, A. A., Rotimi, A. A. and Amao, E. A. 2007.** Effect of different vegetable protein sources on growth and laying performance of Japanese Quails (*Coturnix Japonica*) in a Derived Savannah Zone of Nigeria. *World. Appl. Sci. J.* **3(5):** 567-571.
- Pope, T. and Emmert, J. L. 2001.** Phase feeding supports maximum growth performance of broiler Chicks from forty-three to seventy one days of age. *Poultry Science.* **80:** 345-352.
- Rajini, R. A., Jhanabalan, S., Narahari, D. and Kumararaj, R. 1998.** Influence of season, from of feed and dietary energy levels on broiler performance. *Indian J. Poultry Science.* **33(3):** 341-348.
- Raman, R. S., Lohan, O. P. and Sihag, Z. S. 2010.** Effect of replacing maize with processed bajra and wheat on the growth performance in broilers. *Indian J. Animal Nutrition.* **27:** 309-313.
- Sahin, N., Sahin, K. and Kucuk, O. 2001.** Effects of vitamin E and vitamin A supplementation on performance, thyroid status and serum concentrations of some metabolites and minerals in broiler reared under heat stress (200c). *Veterinary Medicine.* **46(11-12):** 286-292.
- Serafin, J. A. 1982.** Influence of protein level and supplemental methionine in in practical rations for young endangered masked

bobwhite quail. *Poultry Science.* **61(5):** 985-990.

- Sharma, N. C. 1990.** Study on the genetic parameters of body weight and feed consumption traits and development of various selection indices in broilers. *Thesis, M.Sc. Ag. (Animal Breeding) G.B Pant Univr. of Agri. and Tech. Pantnagar.*
- Shashipal, Sharma, A. and Singh, R. 2010.** Effect of dietary protein levels on growth performance, carcass characteristics and economics of broiler production. *Indian J. Animal Nutrition.* **27:** 56-59.
- Sinha, R. R. P. and Verma, A. K. 1984.** Effect of different levels of dietary protein on Japanese quail (*CoturnixcoturnixJapanica*) feeding. *Indian J. Anim. Health* **23(1):** 77-80.
- Snedecor, G. W. and Cochran, W. G. 1989.** *Statistical Methods* (8th edn.). *Iowa State University Press, Ames, Iowa, USA.*
- Srivastava, S. B., Niwas, R., Singh, D. P. and Bisen, B. 2013.** Impact of herbal based diets on production efficiency of broiler. *The Bioscan.* **8(1):** 119-122.
- Swain, B. K. and Johri, T. S. 2000.** Effects of supplementation of combination of different level of vitamin E on relative weight of some organs in broilers. *Indian J. Poultry Science.* **35(1):** 66-69.
- Temim, S., Chagneau, A. M., Guillaumin, S., Michel, J., Peresson, R. and Tesseraud, S. 2000.** Doses excess dietary protein improves growth performance and carcass characteristics in heat exposed chickens. *Poultry Science.* **79(3):** 312-317.
- Urdaneta, R. M. and Leeson, S. 2004.** Muscle (Pectoralis major) protein turnover in young broiler chickens fed graded levels of lysine and crude protein. *Poultry Science.* **83(11):** 1897-903.
- Wijtten, P. J., Hangoor, E., Sparla, J. K. and Verstegen, M. W. 2010.** Dietary amino acid levels and feed restriction affect small intestinal development, mortality and weight gain of male broilers. *Poultry Science.* **89(7):** 1424-39.