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Optimization of dietary energy and protein levels for growth performance in different age group of native Aseel cross chicken

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Abstract

A study was conducted to optimize energy and protein requirement in native chicken variety for a period of 0-16 weeks age involving 540 chicks. In the first phase, nine diets were formulated with three levels of energy (2500, 2600, 2700 kcal ME/Kg) each with three levels of protein (16, 17, and 18% CP) following 3x3 factorial design. Each treatment was allotted with six replicated groups of 10 chicks each for 0-12 week of age. In the second phase same number of birds fed with three levels of energy (2500, 2600, 2700 kcal ME/Kg) each with three levels of protein (12, 13, and 14% CP). Each treatment received same management practices except different treatment diets. No significant differences were observed in BWG and FCR of chicks fed with treatment diets during 0-4 week period. BWG and FCR of chicks were significantly ($p < 0.05$) higher in 2600 ME Kcal/Kg with 17 and 16% CP than the birds fed 2500 ME Kcal/Kg with 16% CP during the period 4-8 weeks but there was no difference in different protein level treatments. During 8-16 weeks of age, birds fed high energy with high protein diet (2700 ME Kcal/Kg with 18% CP) had significantly ($p < 0.05$) higher BWG and better FCR than low energy and low protein diet (2500 ME Kcal/Kg with 16% CP). There was no significant effect on BWG and FCR during 0-12 week period due to dietary treatments but T₁, T₂, T₄ and T₅ had significant ($p < 0.05$) difference on BWG and FCR than T₉ treatment diet. The results revealed that the optimum dietary energy and protein levels for 0-12 and 12-16 weeks were 2700 ME Kcal/Kg with 17% and 2700 ME Kcal/Kg with 13% CP respectively.

Keywords: Energy, protein, growth, native Aseel cross chicken

1. Introduction

Traditionally, native chickens are the mainstay of poultry production in rural and tribal areas in the country. Mostly free range and backyard systems of production with little or no proper housing are followed for native chicken production across the country. Free range and backyard systems are coupled with low input and low output systems. Native chicken production is becoming popular in recent years due to higher demand for their meat and eggs. This can be attributed to their desirable flavour and perceived health benefits due to their slow growth, low fat content and lack of antimicrobial usage as growth promoters.

Native chicken contributed about 14.4% to the total egg production of the country in the year 2016. However, their contribution reduced to 11.96% in 2017, 11.83% in 2018 and further 11.5% in 2019 (BAHS 2019) ^[1]. The decline in contribution of native chicken to total egg production is despite the fact that the population of native chickens increased from 106.7 million (2016) to 109.22 million (2019). Native chicken like Aseel is characterized by their hardiness and ability to thrive under adverse climatic conditions. Though their productivity is low, the birds are known for their meat quality with desirable taste and flavour (Rajkumar *et al.*, 2016) ^[9] well known for its pugnacity, majestic gait, agility, high stamina, and dogged fighting qualities and eight variants of Aseel breed were reported in India.

Expenditure on feeding alone accounts for about 70% of the operational cost of commercial poultry production. With the high cost of nutrients, efficiency of nutrient utilization for the

production of edible protein is equally as important as performance or carcass protein composition in determining optimum energy levels (Jackson *et al.*, 1981) [7]. Energy and protein requirements of Aseel varieties and its crosses could be different from those of layers and fast growing broilers. Requirement of protein may be less but requirement of energy might be high as native chicken like Aseel reared in free range and backyard systems.

The College of Poultry Production and Management at Hosur (CPPM), is developing a chicken variety from the local Aseel chicken population and its crosses. Hence, the present study was carried out to optimize dietary energy and protein requirements for the newly developing native chicken variety at CPPM, Hosur.

2. Materials and Methods

2.1 Experimental Design

A sum of 540 day old chicks of the native chicken variety were received from CPPM, Hosur and were individually weighed, wing banded and distributed randomly into nine treatments for three different levels of energy with three levels of protein and six replicates for each treatment. The experimental design was 3x3 factorial design. Experimental diets were formulated to provide similar nutrients content according to the nutrient requirement suggested by ICAR 2013 [6] (except protein and energy levels).

2.1.1 Phase I (0-12 weeks of age)

All the chicks were randomly distributed to nine dietary treatments (54 replicates of 10 birds in each). Nine dietary treatments with three levels of energy (2500, 2600, 2700 kcal ME/Kg) each with three levels of protein (16, 17, 18 per cent crude protein/ kg diet) following 3 x 3 factorial design were formulated. Each dietary treatment was offered to six replicated groups of 10 chicks each kept in deep litter management. The feed ingredients were analysed for proximate principles while those of mixed feeds were calculated. Feed consumption and body weight were recorded on weekly basis for each treatment. Difference between the initial and final body weight gain chicks over the period and accordingly the feed conversion ratio (FCR) for each treatment was calculated. The ingredient and calculated nutrient composition of diets for starter phase is given in the Table 1.

2.1.2 Phase II (12-16 weeks of age)

After twelve weeks of age, the birds were provided with grower diets with three levels of energy (2700, 2600, 2500 kcal ME) each with three levels of Protein (14, 13, 12 per cent crude protein/ kg diet) from 12 to 16 weeks of age. The ingredient and calculated nutrient composition of diets for grower phases are given in the Table 2. During 0-16 weeks of experimental period, the growth performance of native chicken variety was evaluated by recording livability, body weight, feed intake (FI), and body weight gain (BWG), and feed conversion ratio (FCR) were calculated.

The experimental data was analysed statistically according to the methods described by Snedecor and Cochran. The data was analysed statistically by two-way analysis of variance (ANOVA) using SPSS statistical software. The significant mean differences between the treatments were determined at $p < 0.05$ using Turkey's multiple comparison test various parameters to draw meaningful conclusions.

3. Results and Discussion

3.1 Growth Performance in 0-4 and 4-8 weeks of age

Growth performance of native chicken variety chicks (Aseel cross) during 0-8 week of age is presented in Table 3. The juvenile body weight gain ranges from 101 g to 119 g at 4 weeks of age. There was no significant ($p < 0.005$) difference in body weight gain and feed conversion ratio during 0-4 weeks. Feed consumption is mainly affected by energy and protein content of the diet. The FCR was around 5.0 among the different energy and protein levels of the treatment groups. The growth appears to be slow in this variety during the early period of life and birds continued to grow up to 40 weeks of age (Rajkumar *et al.*, 2016) [9]. During 4-8 weeks of age when compared to other treatment groups T_5 , T_6 , T_8 had significantly ($p < 0.005$) lower FCR than other groups. Though higher BWG was observed among the treatments, only T_5 & T_6 (2600 ME Kcal/Kg) had significant ($p < 0.005$) difference than other treatments. This coincides with the Sizemore *et al.*, (1993) [12] observations that birds receiving the lower density starter diets were significantly lighter than those fed the higher density diets at 3 week of age whereas at 7 week of age no treatment differences in BWG were apparent.

The FCR and body weight gain of chicks did not change significantly during 0-4 weeks due to different energy and protein levels, similarly there was no significant ($p < 0.005$) difference due to interaction between energy and protein in the same period. BWG and FCR of chicks was significantly ($p < 0.005$) higher in 2600 ME Kcal/Kg during the period 4-8 weeks than other energy levels of 2600 ME Kcal/Kg and 2500 ME Kcal/Kg but there was no difference in different protein level treatments. This is in contrast with the findings of Mandal *et al.*, (2016) [8] who found that significantly higher BWG and FCR were recorded in Aseel chicks fed 18% CP diet than 16% CP during 0-4 weeks and 4-8 weeks. The reason might be that the birds provided low CP and Low ME had increased feed consumption for compensation.

3.2 Growth Performance in 8-12 and 12-16 weeks of age

BWG was observed significantly ($p < 0.005$) higher in T_1 (454.4 g), T_2 (460.4 g) and T_4 (459.5 g) groups than other energy and protein interaction groups of 8-12 weeks age but there was no significant difference in FCR in the 8-12 weeks. During 12-16 weeks of age although BWG of birds in T_1 (466.5 g) fed 2700 ME Kcal/Kg and 14% CP was significantly ($p < 0.005$) higher than the T_7 and T_8 , T_9 treatments but they were not significantly heavier than the birds in T_2 , T_3 , T_4 , T_5 , T_6 . FCR was found to be better in T_1 , T_2 and significantly ($p < 0.005$) higher than the T_7 , T_8 , T_9 treatment groups. This agrees with results of Rajpura *et al.*, (2010) [10] who observed that crossbreds fed with diet containing higher energy (2900) irrespective of protein content of the diet had highest BW, weight gain and FCR.

Though there was no significant ($p < 0.005$) difference in FCR of both different energy and protein levels during 8-12 weeks, BWG was significantly ($p < 0.005$) higher in high energy level of 2700 ME Kcal/Kg diet with 18% and 17% protein than the lowest energy (2500 ME Kcal/Kg diet) and protein level (16%) diets in the same period. This is in concurrence with the results of Mandal *et al.*, (2016) [8] who found that significantly ($p < 0.005$) higher BWG and better FCR was noticed in chicks fed 2700 ME Kcal/Kg and 18% CP than those fed 2500 ME Kcal/Kg and 16% CP.

Weight gain was linearly decreased whereas FCR were

increased linearly with the reduction in dietary ME and CP levels during the 12- 16 weeks period. Similarly, BWG in T₁(466.4 g), T₂ (462.1 g), and FCR of T₁(5.93), T₂(5.84) were found to be significant ($p < 0.005$) effect in both high energy (2700, ME Kcal/Kg) and high protein (14%) level diets than medium and low energy (2500 ME Kcal/Kg) and low protein (12%) level diets at 12-16 weeks of age. This is similar to the findings of Mandal *et al.*, (2016) [8] states that body weight and BWG at 20 weeks significantly differ due to protein levels and values were higher at 14% CP level. NRC (1994) has also suggested 14% CP for growing pullet (12-18 weeks) of brown egg laying strain.

3.3 Growth Performance in 0-12 and 0-16 weeks of age

Body weight gain, FCR and livability data are presented in Table 4. The energy and protein levels were different during 0-12 weeks of age to all treatment groups, the results indicated that no significant ($p < 0.005$) difference were observed on BWG and FCR of birds due to interaction of energy and protein levels. Similarly, Chawla *et al.*, (1978) [4] observed no significant effect on BW or FCR of chicks up to 20 weeks of age with graded levels of energy (2000, 2400, 2700 or 3000 Kcal ME /Kg). In the present study supplementation of limiting amino acids in the treatment diets might be the reason for similar growth and FCR between the different treatments. But 0-16 weeks period showed significant ($p < 0.005$) difference in BWG of T₁ (1323 g) T₂ (1330 g), T₄ (1330 g), and T₅ (1315 g) than T₉ (1178 g). FCR was significantly ($p < 0.005$) lower between the treatments T₁ to T₆ (4.59 to 4.74) than T₉ (5.19). Similarly BWG was found to be significantly ($p < 0.005$) higher in treatments of T₁, T₂, T₄ and T₅ than lowest energy and protein treatment (2500 ME Kcal/Kg and 12% CP). Saxena and Thakur (1985) [11] did not observe any difference in weight gain, feed intake and feed

conversion efficiency of commercial egg type pullets up to 8 weeks of age due to dietary proteins levels of 18%, 20% and also by feeding 14%,16%,18% CP for growing pullets (12-18 week).

The BWG and FCR of birds had no significant ($p < 0.005$) differences during 0-12 weeks in different energy and protein level diets. Hidalgo *et al.*, (2004) [5] also found that weight gain and FCR were adversely affected when the broilers were fed diets formulated to contain sub optimum concentrations of ME and CP. Then requirement of energy and protein might be sufficient for the initial phase of 0-12 weeks During 0-16 weeks as a whole period of marketing age is considered energy levels of 2700, 2600 ME Kcal/Kg and protein levels of 14%, 13% CP had significant ($p < 0.005$) effect on BWG and FCR than the lowest energy level (2500 ME Kcal/Kg) and protein level (12% CP) diets. The BW recorded up to 16 weeks was comparable and higher than the findings of Chatterjee *et al.*, (2007) [3] in Aseel chickens. Higher BW might be due to crosses of Aseel with Non descriptive chickens in this study. Conversely Chandra Deo *et al.*, (2013) [2] suggested dietary energy level of 2500 ME Kcal/Kg with 14% CP for growing kadaknath pullets during 12-20 weeks of age. These levels energy and protein might be sufficient due to comparatively smaller size of kadaknath than Aseel type birds.

3.4 Livability

The mortality/Livability was higher in T₁, T₂, T₃, T₄, T₅ and T₈ and only T₃ and T₄ were significantly higher ($p < 0.005$) than T₆, T₇ and T₉ treatment groups. Similarly, there was significantly ($p < 0.005$) higher survivability noticed in high dietary energy 2500 ME Kcal/Kg diet than medium and low energy diets. Birds fed with medium protein levels 17 and 13% had significantly higher survival rate.

Table 1: Ingredient and Nutrient composition of experimental diets (%) with different energy and protein concentrations (0-12 Weeks)

Ingredients	2700 Kcal ME/Kg			2600 Kcal ME/Kg			2500 Kcal ME/Kg		
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Maize	52.88	54.30	55.00	45.50	47.10	48.29	38.50	39.60	40.70
Soybean meal	23.38	20.50	17.20	21.65	18.90	15.80	20.18	17.21	14.15
De-oiled rice bran	19.62	21.09	23.60	28.95	29.76	31.60	37.40	39.00	40.89
Salt	0.32	0.30	0.20	0.08	0.30	0.30	0.15	0.29	0.30
Calcite powder	1.55	1.53	1.52	1.60	1.60	1.60	1.60	1.60	1.60
Di-calcium phosphate	1.45	1.50	1.52	1.40	1.45	1.45	1.35	1.40	1.40
Lysine	0.07	0.13	0.20	0.09	0.14	0.20	0.09	0.15	0.21
Methionine	0.13	0.14	0.15	0.13	0.14	0.15	0.13	0.14	0.15
Vitamin and other supplements*	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nutrient Composition (%)									
ME K.cal/kg	2699	2706	2700	2600	2603	2605	2503	2500	2500
Crude Protein	18.01	17.06	16.01	18.00	17.02	16.00	18.00	17.00	16.00
Lysine	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Methionine	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Calcium	1.00	1.00	0.99	1.01	1.01	1.01	1.00	1.00	1.00
Available Phosphorous	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Crude Fibre	6.13	6.23	6.46	7.30	7.31	7.45	8.35	8.46	8.61
Na	0.38	0.39	0.37	0.34	0.43	0.44	0.41	0.48	0.49

* Vitamins and other supplements included at 0.60 per cent which includes AB2D3K @ 0.02%, Phytase @ 0.006%, Choline chloride @ 0.07%, US curatox @ 0.10%, NSP enzyme @ 0.05%, Meriplex powder @ 0.010% and Ultra TM@0.25% & sodium bicarbonate @0.1%.

Table 2: Ingredient and Nutrient composition of experimental diets (%) with different energy and protein concentration's (13-16 Weeks)

Ingredients	2700 Kcal ME/Kg			2600 Kcal ME/Kg			2500 Kcal ME/Kg		
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉
Maize	56.20	57.26	58.25	48.65	49.97	51.20	41.60	42.80	43.83
Soybean meal	10.45	7.40	4.30	8.70	5.82	2.80	7.25	4.30	1.23
DORB	29.76	31.70	33.73	39.34	40.60	42.23	47.71	49.25	51.20
Salt	0.31	0.27	0.20	0.08	0.30	0.30	0.20	0.29	0.27
Calcite	1.30	1.32	1.40	1.35	1.37	1.34	1.35	1.35	1.40
Dicalcium phosphate	1.10	1.10	1.10	1.00	1.00	1.10	1.00	1.05	1.00
Lysine powder	0.13	0.19	0.25	0.13	0.19	0.26	0.14	0.20	0.26
Methionine powder	0.09	0.10	0.11	0.10	0.10	0.12	0.09	0.10	0.11
Vitamin and other supplements*	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Nutrient Composition (%)									
ME K.cal/kg	2701	2701	2700	2601	2601	2601	2501	2501	2500
Crude Protein	14.00	13.01	12.00	14.00	13.00	12.00	14.00	13.00	12.00
Lysine	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Methionine	0.30	0.30	0.30	0.31	0.30	0.30	0.30	0.30	0.30
Calcium	0.80	0.80	0.82	0.80	0.80	0.80	0.80	0.80	0.80
Available Phosphorous	0.33	0.32	0.32	0.32	0.31	0.33	0.33	0.33	0.32
Crude Fibre	7.07	7.23	7.40	8.28	8.34	8.46	9.32	9.42	9.58
Na	0.45	0.44	0.43	0.41	0.50	0.51	0.50	0.54	0.55

*Vitamins and other supplements included at 0.66 per cent which includes UltraviteM @ 0.25%, AB2D3K @ 0.02%, Pytase@ 0.006%, Choline chloride @ 0.07%, US curatox @ 0.10%, NSP enzyme @ 0.05%, Meriplex powder @ 0.014%, liver tonic@ 0.01%. & sodium bicarbonate @0.1%.

Table 3: Effect of different levels of Energy and Protein on body weight gain and FCR during 0-4, 4-8, 8-12 and 12-16 weeks of age.

Treatments	(0-4 Wks)		(4- 8Wks)		(8-12Wks)		(12-16 Wks)	
	BWG	FCR	BWG	FCR	BWG	FCR	BWG	FCR
T ₁	107.3 ±4.17	4.89±0.23	294.68±9.60 ^{ab}	4.08±0.16 ^{ab}	454.58±11.94 ^b	4.07±0.15	466.47±12.51 ^d	5.93±0.19 ^a
T ₂	109.4 ± 4.15	4.96±0.23	297.89±9.53 ^{ab}	4.03±0.15 ^{ab}	460.43±11.86 ^b	4.03±0.15	462.17±12.43 ^{cd}	5.84±0.18 ^a
T ₃	105.0 ± 4.07	4.92±0.22	317.74±9.35 ^{ab}	3.79±0.15 ^{ab}	433.08±11.63 ^{ab}	4.20±0.14	411.49±12.19 ^{abc}	6.48±0.18 ^{abc}
T ₄	114.1 ± 4.12	4.63±0.23	310.45±9.47 ^{ab}	3.99±0.15 ^{ab}	459.51±11.78 ^b	4.42±0.15	446.61±12.34 ^{bcd}	6.07±0.18 ^{ab}
T ₅	103.8 ±4.09	5.06±0.22	318.91±9.41 ^b	3.53±0.15 ^a	446.57±11.70 ^{ab}	4.08±0.14	445.88±12.26 ^{bcd}	6.00±0.18 ^{ab}
T ₆	101.1 ±4.32	5.17±0.24	323.88±9.94 ^b	3.43±0.16 ^a	427.16±12.36 ^{ab}	4.33±0.15	422.38±12.96 ^{abcd}	6.42±0.19 ^{abc}
T ₇	104.9 ±4.26	4.98±0.24	300.10±9.98 ^{ab}	3.96±0.16 ^{ab}	446.88±12.19 ^{ab}	4.23±0.16	403.61±12.77 ^{ab}	6.76±0.18 ^{bc}
T ₈	107.7 ±4.07	4.78±0.23	315.31±9.35 ^{ab}	3.59±0.15 ^a	430.74±11.62 ^{ab}	4.25±0.14	397.44±12.18 ^{ab}	6.77±0.18 ^{bc}
T ₉	119.30±4.23	4.54±0.23	275.69±9.73 ^a	4.32±0.16 ^b	399.90±12.10 ^a	4.613±0.15	383.63±12.68 ^a	7.22±0.18 ^c
Effect of Energy levels								
2700 ME Kcal	107.26±2.38	4.92±0.13	303.44±5.48 ^a	3.96±0.09 ^b	449.38±6.81 ^b	4.10±0.09	446.71±7.14 ^b	6.08±0.11 ^a
2600 ME Kcal	106.34±2.41	4.96±0.13	317.75±5.54 ^b	3.65±0.09 ^a	444.42±6.90 ^{ab}	4.28±0.08	438.29±7.23 ^b	6.16±0.10 ^a
2500 ME Kcal	110.64±2.41	4.76±0.13	297.04±5.56 ^a	3.95±0.09 ^{ab}	425.84±6.91 ^a	4.36±0.08	394.89±7.24 ^a	6.92±0.10 ^b
Effect of Protein levels								
18%CP	108.79±2.42	4.84±0.13	301.74±5.55	4.01±0.09	453.66±6.10 ^b	4.24±0.08	438.90±7.24 ^b	6.25±0.10 ^a
17%CP	106.99±2.37	4.93±0.13	310.71±5.44	3.72±0.08	445.94±6.78 ^b	4.12±0.08	435.16±7.09 ^b	6.20±0.10 ^a
16%CP	108.45±2.43	4.88±0.14	305.77±5.58	3.84±0.09	420.05±6.95 ^a	4.38±0.09	405.83±7.28 ^a	6.71±0.11 ^b

* "Means in columns not sharing a common superscript differ significantly ($p < 0.05$)"

Table 4: Effect of different levels of Energy and Protein on body weight gain and FCR during 0-12 and 0-16 weeks of age.

Treatments	BWG (0-12 weeks)	FCR (0-12 weeks)	BWG (0- 16 weeks)	FCR (0-16 weeks)	Livability% (0-16 weeks)
T ₁	856.59±21.14	4.06±0.10	1323.06±28.71 ^b	4.59±0.10 ^a	94.50±0.59 ^{de}
T ₂	867.83±20.99	4.05±0.10	1330.01±28.52 ^b	4.62±0.10 ^a	92.07±0.59 ^{de}
T ₃	855.82±20.59	4.02±0.10	1267.31±27.96 ^{ab}	4.74±0.09 ^a	96.56±0.59 ^e
T ₄	884.12±20.86	3.95±0.10	1330.74±28.33 ^b	4.61±0.09 ^a	95.01±0.59 ^e
T ₅	869.29±20.72	3.93±0.10	1315.16±28.15 ^b	4.55±0.09 ^a	92.12±0.59 ^{cd}
T ₆	852.10±21.90	4.02±0.11	1274.48±29.73 ^{ab}	4.74±0.10 ^a	85.07±0.59 ^a
T ₇	851.86±21.58	4.13±0.11	1255.46±29.31 ^{ab}	4.88±0.10 ^{ab}	86.69±0.59 ^{ab}
T ₈	853.79±20.59	3.96±0.10	1251.26±27.97 ^{ab}	4.77±0.09 ^{ab}	93.22±0.59 ^{de}
T ₉	794.90±21.43	4.38±0.11	1178.53±29.11 ^a	5.19±0.10 ^b	89.00±0.59 ^{bc}
Effect of Energy levels					
2700 ME Kcal	860.08±12.07	4.04±0.06	1306.79±16.40 ^b	4.65±0.06 ^a	94.38±0.34 ^b
2600 ME Kcal	863.50±12.21	3.96±0.06	1306.79±16.59 ^b	4.64±0.06 ^a	90.73±0.34 ^a
2500 ME Kcal	833.51±12.24	4.16±0.06	1228.40±16.63 ^a	4.95±0.06 ^b	89.64±0.34 ^a
Effect of Protein levels					
18% CP	864.18±12.23	4.04±0.06	1303.09±16.62 ^b	4.69±0.06 ^a	92.07±0.34 ^{ab}
17% CP	863.63±11.99	3.98±0.05	1298.79±16.28 ^b	4.65±0.06 ^a	92.47±0.34 ^b
16% CP	834.27±12.30	4.14±0.06	1240.10±16.71 ^a	4.90±0.06 ^b	90.21±0.34 ^a

* "Means in columns not sharing a common superscript differ significantly ($p < 0.05$)"

4. Conclusion

Body weight gain and feed conversion was not influenced by different energy and protein level diets for this native chicken variety up to 0-12 weeks but for 0-16 weeks significantly higher BWG and better FCR was found in birds fed with 2700 and 2600 ME Kcal/Kg with 18%, 17% CP for 0-12 weeks and the same energy level with 14%, 13% CP for 12-16 weeks. It was concluded that the dietary energy level of 2700 ME Kcal/Kg with CP 17% and the same energy level with 13% CP were optimum for better growth performance of native chicken variety during 0-12 weeks and 12-16 weeks respectively.

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Conflict of Interest

Not available

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