GROWTH PERFORMANCE OF JAPANESE QUAILS (*Coturnix coturnixjaponica*) FED DIETS CONTAINING VARYING DIETARY LEVELS OF PROTEIN AND ENERGY

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Abstract

Present experiment was conducted to evaluate the effect of diets containing varying levels of crude protein (20, 22, 24 and 26%) and metabolizable energy (2600, 2800, 3000 and 3200 kcal/kg) on growth performance of growing Japanese quail. A total of 576 two-week old quail chicks were assigned into 16 treatments. Each treatment were replicated three times and each replicate had 12 birds using a 4 by 4 factorial arrangement in a completely randomized design. Data on performance and nutrient digestibility were recorded and analyzed using a completely randomized design with a 4×4 factorial arrangement during 6 weeks of age. Results of the study showed that both the main and interaction of varying dietary protein and energy levels had no effect on the growth performance of Japanese quails. It could, thus, be recommended that the lowest protein (20 %) and energy (2600 kcal ME/kg) levels be used in the diets of Japanese quails for optimal growth performance since their performance is similar even at the highest protein and energy levels.

Keywords: *Japanese quail, Crude protein, Metabolizable energy, Performance*

Introduction

The world population is growing at an alarming rate. According to PRB (Population Reference Bureau) Projects, Africa's population will more than double to 2.6 billion by 2050 and will account for about 58 percent of the global population increase by that date (Rosen *et al.*, 2016). With this population and the increased concern over low dietary animal protein supply. There is urgent need to increase the animal protein supply. This has led to search for animal that can supply the needed protein. If there is to be progress in this, effort must be placed on identification of alternative food resources that can meet to pace of the population growth (Rosen *et al*, 2016). The incorporation of game birds has been recommended, particularly for developing countries (Geldenhuys *et al.*, 2013) and one of the game birds that has identified is quail.

Quail has attained economic importance as an agricultural species producing eggs and meat that are enjoyed for their unique flavor. They have low maintenance cost because of their small body size (80-300 g), short generation interval having three to four generations in a year). Quail birds are more resistance to diseases and they have high egg production, thus they are an excellent laboratory animal because of their short generation interval. However, the nutritional requirement of this birds for the tropics have not been well established. Studies has shown that the nutrient of birds varies from species to species and from one location to another. Presently, in Nigeria, the diets fed to quail are mostly based on 24 and 20 % of crude protein for rearing and production, respectively, as recommended by NRC (1999) and there are also variations in the dietary crude protein and energy recommendations for quails.

Woodard *et al*., (1973) reported that quail can be raised on turkey starter diets containing 25 – 28 % crude protein while Lee *et al*. (1977) on the other hand indicated that dietary crude protein level of 24 % is needed in starter diet for quail and the protein content may be reduced to 20 % by 3rd week of age. Nwokedi *et al*. (2010) observed that when four crude protein levels of 20, 22, 24 and 26% were evaluated for Japanese quails, birds on 20 % crude protein level resulted in best performance from 1 to 42 days of age. Murakami *et al*. (1993) discovered that 18% crude protein was adequate at the laying phase this is, however, lower than the 20% recommended by NRC (1994) and 22.42% recommended by Pinto *et al*. (1998).Report of Reda *et al*. (2015) indicated that Japanese quail fed crude protein and energy levels of 22 % and 2900 kcal ME/kg, respectively, as adequate during the first few weeks of growth. While Jahanian and Edriss (2015) reported that Japanese quail fed CP and energy levels of 26 % and 3000 kcal ME/kg, respectively, for the same period.

For the review above, that there are variations in the Japanese quail requirements for energy and protein. The variation might be attributed to region (climatic), breed of quails, time of rearing among others. This study will therefore, determine the effect of four different energy (2600, 2800, 3000 and 3200 Kcal) and four dietary protein levels of 20, 22, 24 and 26 % on the growth performance of Japanese quail raised under intensive management system in Nigeria (a tropical country).

Materials and Methods

The study was conducted at the teaching and Research Farm of Animal Production Department Federal University of Technology Minna, Niger state. Minna lies between latitude $9^0 15^1$ and $9^0 45^1$ N and between longitude $6^0 15^1$ and $6^0 45^1$ of the equator. The mean annual rainfall is between 1200 and 1300 mm and mean temperature ranges from 38 – 42^{o}C

A total of five hundred and seventy-six (576) two weeks old Japanese quails obtained from the National Veterinary Research Institute, VOM, Nigeria. The two-week old quail chicks were assigned into 16 treatments. Each treatment was replicated thrice and each replicate had 12 birds using a 4 by 4 factorial arrangement in a completely randomized design. The experimental diets were corn-soybean based with 4 levels of protein (20, 22, 24 and 26% CP) at either of 4 levels of energy (2600, 2800, 3000 and 3200 kcal ME/kg diet). The composition of the experimental diets is presented in Table 1. The birds in all the treatments were subjected to similar management practices throughout the six weeks experimental period.

Initial weights were determined at the start of the experiment with the aid of salter weighing scale (SGF 400) balance and thereafter at weekly intervals. The final weight was also taken by weighing the birds in each replicate on the last day of the experiment using the same weighing balance. The weight gain was calculated by subtracting the initial weight from the final weight. In addition, the feed intake was calculated by subtracting the feed remaining from the total feed supplied each day before serving fresh one. The feed conversion ratio was also calculated by dividing feed intake by weight gain.

Data Analysis. All data generated were analyzed using two-way analysis of variance (ANOVA) and where significant differences occurred, the means was separated using Duncan Multiple Range Test as contained in the SAS package (2015), version 15.0.

Table 1. Ingredients composition of the Experiment

Ingredient	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16
Maize	40.00	40.00	45.00	50.00	40.00	42.00	46.00	45.00	40.00	44.00	44.00	40.00	40.00	40.00	40.00	40.00
G/Cake 44%	4.00	4.00	4.00	4.00	6.00	4.00	4.00	4.00	18.00	11.00	5.00	9.00	13.00	12.00	10.00	8.00
Full fat soya	30.00	30.00	31.00	30.00	31.00	36.00	34.00	34.00	24.00	31.00	36.00	36.00	22.00	32.00	31.00	30.00
Fish meal	3.00	3.00	3.00	3.00	4.00	3.00	4.00	4.00	4.00	4.00	5.00	4.00	10.00	6.00	8.00	10.00
Rice offal	18.00	16.00	8.00	2.00	14.00	10.00	4.00	2.00	9.00	5.00	3.00	0.00	10.00	4.00	2.00	0.00
Limestone	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Palm oil	0.00	2.00	4.00	6.00	0.00	0.00	3.00	6.00	0.00	0.00	2.00	6.00	0.00	1.00	4.00	7.00
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Vit. Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
L-Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DI-Methione	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
TOTAL	100.0	100.00	100.00	100.00	100.0	100.0	100.0	100.0	100.00	100.0	100.00	100.0	100.00	100.0	100.00	100.0
Calculated analysis																
CP	20.00	20.00	20.00	20.00	22.00	22.00	22.00	22.00	24.00	24.00	24.00	24.00	26.00	26.00	26.00	26.00
ME	2600.0	2800.0	3000.0	3200.0	2600.0	2800.0	3000.0	3200.0	2600.0	2800.0	3000.0	3200.0	2600.0	2800.0	3000.00	3200.0
% EE	8.37	10.06	11.78	13.26	8.52	9.00	11.31	13.86	7.70	8.47	10.77	14.22	7.52	9.54	11.97	14.40
% CF	9.82	9.04	6.08	3.80	8.44	7.07	4.72	3.92	6.83	5.32	4.46	3.44	6.87	4.98	4.04	3.11
Avail P %	0.47	0.46	0.46	0.45	0.50	0.47	0.49	0.48	0.50	0.50	0.52	0.49	0.65	0.55	0.60	0.65
% Lysine	1.29	1.28	1.31	1.29	1.39	1.42	1.43	1.42	1.41	1.47	1.54	1.54	1.60	1.60	1.65	1.69

Key: CP = Crude protein, **ME** = Metabolism energy, **EE** = Eater extract, **CF** = Crude fiber, **Avail P** = Available protein, **G/cake** = Groudnut cake, **T** =Treatment

Results and Discussion

The main effect of dietary protein and energy levels on the growth performance results of Japanese quails is presented in Table 2. All the growth performance parameters measured there were no significant differences observed between the treatment group on the performance value recorded.

The interaction results between protein and energy levels on performance were presented in Table 3. There were similar in the main performance of the Japanese quail in all the parameters. The interaction of protein and energy on all the performance parameters was not significant.

Table 2Main effect of dietary protein and energy on performance of Japanese Quails

Treatments	Initial weight	Final weight	Weight Gain	Daily weight Gain	Total feed intake	Daily feed Intake	FCR
Effect of crude protein							
20.00	20.23	84.16	63.94	1.52	892.89	21.26	2.00
22.00	20.27	84.83	64.56	1.53	893.01	21.26	1.98
24.00	20.25	84.63	64.38	1.53	915.44	21.80	2.02
26.00	20.24	84.06	64.82	1.54	903.16	21.50	2.04
SEM	0.02	0.66	0.65	0.02	20.92	0.50	0.06
p. value	NS	NS	NS	NS	NS	NS	NS
Effect of energy							
26.00	20.26	83.91	63.65	1.52	928.44	22.11	2.04
28.00	20.24	84.14	63.90	1.53	926.41	22.06	2.07
30.00	20.24	84.94	64.70	1.54	883.61	21.04	1.96
32.00	20.26	84.53	64.27	1.53	865.95	20.62	1.94
SEM	0.03	0.66	0.65	0.02	20.92	0.50	0.06
p. value	NS	NS	NS	NS	NS	NS	NS

Table 3Interaction effect of dietary protein and energy on performance of Japanese Quails

Protein	Energy	Initial weight	Final weight	Weight Gain	Daily weight Gain	Total feed Intake	Daily feed intake	FCR
20.00	26.00	20.21	84.35	64.14	1.54	875.90	20.85	1.92
	28.00	20.21	83.56	63.35	1.51	935.44	22.27	2.11
	30.00	20.25	84.71	64.50	1.54	880.58	20.97	1.95
	32.00	20.29	82.80	62.55	1.49	879.63	20.94	2.01
22.00	26.00	20.25	85.15	64.86	1.54	982.17	23.38	2.17
	28.00	20.21	85.29	65.04	1.55	910.70	21.68	2.00
	30.00	20.33	85.25	63.31	1.55	842.45	20.06	1.85
	32.00	20.25	83.64	63.31	1.51	836.71	19.92	1.89
24.00	26.00	20.25	83.62	63.37	1.51	954.00	22.71	2.08
	28.00	20.25	83.89	63.14	1.51	937.74	22.33	2.12
	30.00	20.25	85.89	65.64	1.56	883.80	21.04	1.82
	32.00	20.25	85.62	65.37	1.50	886.20	21.10	1.94
26.00	26.00	20.25	85.28	65.03	1.55	901.70	21.47	1.98
	28.00	20.25	84.33	64.04	1.53	921.75	21.95	2.06
	30.00	20.25	82.89	62.64	1.49	927.93	22.09	2.12
	32.00	20.21	83.74	63.53	1.50	861.25	20.51	1.94
SEM		0.06	1.31	1.30	0.03	41.85	1.00	0.11
p. value		NS	NS	NS	NS	NS	NS	NS

Conclusion

Results of the study showed that both the main and interaction of varying dietary protein and energy levels had no effect on the growth performance. It could be recommended that the lowest protein (20 %) and energy (2600 kcal ME/kg) levels be used in the diets of Japanese quails for optimal performance since their performance is similar even at the highest protein and energy levels. Further study on the digestibility and economic of production can be carried out to ascertain the effect on the quails.

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