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EFFECT OF FEEDING DIFFERENT LEVELS OF ENERGY AND LYSINE ON EGG QUALITY CHARACTERISTICS OF *TANUVAS NAMAKKAL GOLD JAPANESE QUAIL* HENS

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Abstract: The aim of the present research was to study egg quality characteristics by feeding different levels of energy and lysine in laying TANUVAS Namakkal gold quail. A total of 360 Japanese quails aged 7 weeks old were divided into nine equal groups of four replicates each consisting of 10 quails. Nine diets including three levels of ME (2600, 2700 and 2800 Kcal/kg) each at three levels of lysine (0.8, 0.9 and 1.0 per cent) were formulated (3×3 factorial design) with 18% crude protein in all the treatments. The laying phase of twenty weeks was divided into five periods with 28 days duration. During the last three days of every 28 days period egg quality traits like egg weight, shape index, albumen index, yolk index and shell thickness were evaluated. There were no differences between the experimental groups in terms of egg weight, shape index, yolk index, albumen index and egg shell thickness. In conclusion, the levels of energy and lysine supplementation in the quail diet did not appear to have any significant effect in egg quality but did not have any negative performance.

Keywords: Egg quality characteristics, laying quails, energy and lysine

Introduction

Genetic improvement in poultry was achieved to great extent and this prompts for updating the feeding standards of the birds. One such evolution is the new egg type Japanese quail strain "TANUVAS Namakkal gold Japanese quail" developed by the Department of Poultry Science, Veterinary College and Research Institute, Namakkal under Tamil Nadu Veterinary and Animal Sciences University.

Research related to modification of feeding was carried out in poultry and turkeys but only occasionally in quails. Popularity of quails has increased but research on its feeding requirements is not carried out. There are some differences with the nutritional requirements of quail as determined by various authors (Tarasewicz *et al.* 2006).

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The production performance of the TANUVAS Namakkal gold Japanese quail is superior to either parents and thus proved "hybrid vigour" and is regularly used for commercial egg production purpose. Hence these birds require different nutrient level than the conventional Japanese quails.

Energy and protein are the main nutrients considered in feed formulation. The requirements of limiting amino acids and supplementing these amino acids in diet provide scope to reduce dietary protein (CP) content. The ideal protein concept implies feeding the best ratios between lysine and other amino acids, thus reducing the crude protein content of the diet. However Alagawany *et al.* (2014) reported that adequate amino acid balance is the most important nutrient for Japanese quails. Hence by evaluating the effect of different dietary metabolizable energy and lysine levels on the performance, the optimum nutrient requirement of TANUVAS Namakkal gold Japanese quail can be standardized.

In this light, a study was undertaken with the aim to standardize the energy and lysine requirements of "TANUVAS Namakkal gold Japanese quail" and to examine their effect on selected production parameters and egg quality of the birds.

Materials and Methods

The experiment was conducted in "TANUVAS Namakkal gold Japanese quails" from day old to twenty nine weeks of age. The whole experimental period was divided into three phases *viz.* chick (0-2 weeks), grower (3-5 weeks) and layer (7-26 weeks)**.** Seven hundred and twenty day old quail chicks were divided into nine treatments with four replicates of 20 chicks each. Nine experimental diets were formulated in 3x3 factorial arrangements with three levels of dietary energy (2700, 2800 and 2900 Kcal/kg) and three levels of lysine (1.2, 1.3 and 1.4) with 20.3 per cent crude protein for 0-2 weeks in all treatments during chick phase and three levels of dietary energy (2700, 2800 and 2900 Kcal/kg) and three levels of lysine (1.1, 1.2 and 1.3) with 19.4 per cent crude protein for 3-5 weeks in all treatments during for grower phase. After five weeks only 10 females were retained in each replicate so a total of 360 birds were maintained during the laying phase. Nine experimental diets were formulated in 3x3 factorial arrangements with three levels of dietary energy (2600, 2700 and 2800 Kcal/kg) and three levels of lysine (0.8, 0.9 and 1.0 per cent) with 18 per cent crude protein from 7-26 weeks in all treatments during layer phase.

The quail chicks used for the experiment were housed in cage system and maintained under standard managemental conditions. The laying phase was divided into five periods with 28 days duration. Twenty four eggs per treatment were randomly collected during the last three

days of every 28 days period and were used to measure the egg quality parameters such as egg weight, shape index, albumen index, yolk index and shell thickness. The data were analysed statistically as per the methods described by Snedecor and Cochran (1994).

Results and Discussion

Neither the three levels of energy and lysine had any significant influence on egg weight, shape index, albumen index, yolk index and shell thickness in Japanese quail layer hens during the experimental period from 7 to 26 weeks. In the present study there were no negative effects in the external or internal quality of quail eggs due to low levels of energy or lysine supplementation in the diet.

The egg weight on average ranged from 12.33 to 12.68 g. There was no significant effect in egg weight due to feeding of different levels of energy and lysine. Similarly there was no significant effect in egg weight due to interaction between feeding of different levels of energy and lysine. Kadam *et al.* (2006) and Sung-Taek *et al.* (2012) reported no significant difference in egg weight due to different levels of energy and lysine supplementation in the diet which was in accordance with our study.

On the contrary Yusuf *et al.* (2016) who recorded significantly ($P<0.05$) higher egg weight in low energy and low protein levels. While Pinto *et al.* (2002), Agoor *et al.* (2006) recorded high egg weight in high energy group. Tarasewicz *et al.* (2006) reported significantly higher ($P<0.05$) egg weight in high and medium energy, protein and lysine. The consumption of protein influences the weight of the eggs. Because hens have little ability to store protein, the level of feed intake are important to the daily intake of this nutrient in order to meet the demands of producing heavier eggs (Pesti *et al.*, 1992).

No significant difference in shape index was observed due to feeding of different levels of energy and lysine. The average shape index ranged from 78.03 to 78.59. This result was in accordance with Aggoor *et al.* (2006), Kadam *et al.* (2006), Abdel-Azeem (2011) and Yusuf *et al.* (2016) who reported no significant difference in shape index due to feeding of different levels of energy and lysine in Japanese quails. But Sethi *et al.* (2012) reported significantly ($P<0.05$) higher shape index in low energy. Tarasewicz *et al.* (2006) reported significantly higher ($P<0.05$) shape index in low energy, protein and lysine which was not in accordance with this study.

Albumen index was not affected by feeding different levels of energy and lysine in this trial. Aggoor *et al.* (2006), Tarasewicz *et al.* (2006), Abdel-Azeem (2011) and Bulbul *et*

al. (2015) reported no significant effect in albumen index with effect of feeding different levels of energy, lysine and protein which was in accordance with our trial.

Yolk index showed no changes in any of the experimental groups due to feeding of different levels of energy and lysine. This result was in concurance with Bulbul *et al.* (2015) who reported no significant effect in yolk index with effect of feeding different levels of energy, lysine and protein whereas Tarasewicz *et al.* (2006) reported significantly higher ($P<0.05$) yolk index in high energy, protein and lysine.

No significant difference in shell thickness was observed due to feeding of different levels of energy and lysine during the laying phase. This inference was in agreement with Aggoor *et al.* (2006), Kadam *et al.* (2006), Abdel-Azeem (2011), Sung-Taek *et al.* (2012) and Bulbul *et al.* (2015).

Conclusion

As a result of different levels of energy and lysine supplementation with fixed crude protein level in the diets of TANUVAS Namakkal gold quails during the laying period did not affect egg weight or any of the egg quality studies like shape index, albumen index, yolk index and shell thickness. No negative effects in the external or internal quality of quail eggs due to low or high levels of energy or lysine supplementation in the diet was observed. It can be concluded that even the low level of energy and lysine supplementation is sufficient to maintain the required egg quality of quail eggs.

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Mean (±S.E.) of external and internal egg quality traits of "*TANUVAS Namakkal gold quail*" from 7 to 26 weeks of age as influenced by different levels of energy and lysine

Treatment groups	Egg weight	Shape index	Albumen index	Yolk index	Shell thickness
General Linear Model (GLM) analysis of Energy X Lysine level interaction					
T_1	12.48±0.25	78.51±0.22	0.095±0.002	0.409±0.004	0.200±0.001
T_2	12.46±0.19	78.30±0.24	0.091±0.001	0.411±0.003	0.201±0.001
T_3	12.33±0.09	78.11±0.35	0.093±0.002	0.404±0.003	0.203±0.001
T_4	12.28±0.18	78.33±0.37	0.093±0.002	0.407±0.003	0.201±0.001
T_5	12.24±0.14	78.04±0.33	0.092±0.002	0.411±0.003	0.200±0.001
T_6	12.48±0.18	78.03±0.30	0.091±0.002	0.413±0.002	0.203±0.001

T_7	12.46±0.16	78.59±0.31	0.094±0.002	0.412±0.003	0.201±0.001
T_8	12.57±0.10	78.42±0.33	0.093±0.001	0.411±0.004	0.200±0.001
T_9	12.68±0.16	78.31±0.32	0.093±0.002	0.406±0.002	0.202±0.002
P value	0.762	0.998	0.880	0.679	0.904
General Linear Model (GLM) analysis of Energy levels					
2600	12.40±0.11	78.48±0.18	0.094±0.001	0.409±0.002	0.201±0.001
2700	12.42±0.09	78.25±0.17	0.092±0.001	0.411±0.002	0.200±0.001
2800	12.50±0.09	78.15±0.18	0.093±0.001	0.410±0.002	0.203±0.001
P value	0.766	0.423	0.538	0.865	0.062
General Linear Model (GLM) analysis of Lysine levels					
0.8	12.42±0.10	78.31±0.16	0.093±0.001	0.408±0.002	0.201±0.001
0.9	12.33±0.09	78.13±0.19	0.092±0.001	0.410±0.002	0.201±0.001
1.0	12.57±0.08	78.44±0.18	0.093±0.001	0.410±0.002	0.201±0.001
P value	0.243	0.483	0.684	0.420	0.978

n=24

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