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EFFECT OF OMEGA-3 PUFA RICH OIL SOURCES ON EGG PRODUCTION PERFORMANCE OF JAPANESE QUAIL

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Abstract: A study was conducted to assess the egg production performance in Japanese quail upon enrichment of quail diets with Omega-3 PUFA rich sources like fish oil and linseed oil, independently and simultaneously at 2 and 4 per cent levels. The biological experiment was carried out by using Japanese quail that were randomly allotted to seven treatment groups with three replicates having ten females in each replicate. Japanese quail were reared under cage system to study the effect of feeding fish and linseed oils on laying performance from 7 to 26 weeks of age. The birds were provided with diets by incorporating different levels of fish and linseed oils individually or in combination. All the birds were fed with experimental diet *ad libitum* and had free access to wholesome water throughout the experimental period. The results of this study revealed that Japanese quail layers in 2 per cent fish oil group (84.62 per cent) recorded the highest hen day egg production. However, significant difference ($P<0.05$) in hen housed egg production was observed during 7-10 weeks of experimental period. At the end of the study period, Japanese quail layers fed with 2 per cent fish oil (T_2) (114.86 eggs) recorded the highest hen housed egg production when compared to control group (T_1) (110.77 eggs).

Keywords: Japanese quail-Designer egg-Omega-3 Polyunsaturated fatty acids – Egg laying performance.

Introduction

Japanese quail *(Coturnix coturnix japonica)* is the smallest domesticated avian species grown for meat and egg production. Commercial quail farming is becoming more popular and is being increasingly gaining momentum in Asian countries especially India. Its unique characteristics include attaining early sexual maturity (at 6 weeks of age) with higher rate of egg production, rapid growth, shorter generation interval, simple rearing procedure, its ability to withstand wider range of climatic and farm conditions. The present study was carried out to study the effect of feeding Omega-3 Polyunsaturated fatty acid (PUFA) rich fish oil and linseed oil sources on egg production performance of Japanese quail.

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Materials and Methods

Japanese quail were reared under cage system to study the effect of feeding fish and linseed oils on laying performance from 7 to 26 weeks of age. The birds were provided with diets by incorporating different levels of fish and linseed oils individually or in combination. Japanese quail were randomly allotted to seven treatment groups as T_1 (Control : without oils), T_2 (2% Fish oil), T_3 (2% Linseed oil), T_4 (4% Fish oil), T_5 (4% Linseed oil), T_6 : 2% oil (1% Fish oil + 1% Linseed oil) and T_7 : 4% oil (2% Fish oil + 2% Linseed oil) with three replicates having ten females in each replicate. All the birds were fed with experimental diet *ad libitum* and had free access to wholesome water throughout the experimental period. Sixteen hours total light (photoperiod) was provided daily throughout the experimental period.

During the experimental period, the egg production was recorded daily in all the treatments. Based on the data, egg production was calculated in terms of hen day (per cent) and hen housed (number) egg production. The data collected were subjected to statistical analyses as per Snedecor and Cochran (1989).

Results and Discussion

Hen day egg production

The results of the study showed that the Japanese quail layers in 2 per cent fish oil group (84.62 per cent) recorded the highest hen day egg production (Table-1). However, the birds in group T_7 (4% fish oil + linseed oil) (80.14 per cent), T_5 (4 % linseed oil) (79.62 per cent) and T_6 (2% fish oil +linseed oil) (79.34 per cent), T_3 (2% linseed oil) (75.93 per cent) and T_4 (4% fish oil) (75.16 per cent) recorded numerically lower hen day egg production than control group (T_1). Though numerical increase or decrease over control groups and vast variation in hen day egg production were noticed due to different dietary treatments, the statistical analysis did not reveal any significant difference on mean hen day egg production in all the periods.

Hen housed egg production

Though vast variation and the increase or decrease in hen housed egg production were numerical in group of Japanese quail under different dietary treatments over birds fed basal diet (control), the statistical analysis revealed non-significant difference on mean hen housed egg production of age. However, significant difference ($P<0.05$) in hen housed egg production was observed during 7-10 weeks of experimental period. At the end of the study period, Japanese quail layers fed with 2 per cent fish oil (T_2) (114.86 eggs) recorded the

highest hen housed egg production when compared to control group (T_1) (110.77 eggs) (Table-2).

The analysis of data on hen day and hen housed egg production due to n-3 PUFA rich oil source supplementation at graded levels did not show any significant variation among the treatment groups. The earlier reports of Hargis *et al.* (1992), Herber and Van Elswyk (1996), Meluzzi *et al.* (2000) and Halle (2001) are in agreement with the results of this study.

Scheideler and Froning (1996) reported that supplementation of fish oil to the diets of laying hens significantly improved egg production than those compared with flaxseed and control groups. Meanwhile, Schumann *et al.* (2000) reported that supplementation of flaxseed and flax oil to laying hens had reduced egg production throughout the experimental period which is in agreement with the results of this study. Contrary to the above findings, egg production of 12 weeks old Japanese quail fed with 2 per cent flaxseed oil (linseed oil) was significantly higher ($P<0.05$) as compared to birds fed with 2 per cent sunflower oil. As reported by Balevi and Coskun (2000), Baucells *et al.* (2000) and Grobas *et al.* (2001), hen day and hen housed egg production in the overall study period revealed non significant difference among treatment groups.

Table 1: Mean hen day egg production (%) (±S.E.) of Japanese quail layers as influenced by feeding **PUFA rich oil sources from 7 to 26 weeks of age**

Treatment groups	7-10 weeks	11-14 weeks	15-18 weeks	19-22 weeks	23-26 weeks	7-26 weeks
T_1- Control	68.45±2.86	80.64±1.01	83.88± 4.08	86.97± 4.54	82.76±3.94	80.54±1.79
T_2- 2% Fish oil (FO)	65.95±1.92	89.30±4.54	90.31± 2.62	88.45± 2.66	89.09±0.82	84.62±2.23
T_3- 2% Linseed oil (LO)	69.29±3.17	79.40±7.40	80.71± 4.95	75.48± 4.70	74.76±1.90	75.93±4.34
T_4- 4%Fish oil	58.98±1.81	78.73±3.23	80.50± 2.09	78.85± 4.35	78.73±5.35	75.16±2.55
T_5- 4%Linseed oil	60.71±4.65	82.81±4.71	83.06± 6.33	85.19± 2.08	86.32±1.11	79.62±3.27
T_6- 2 % (FO +LO)	59.49±2.69	83.69±1.24	86.76± 1.12	84.54± 2.20	82.34±2.37	79.34±0.87
T_7- 4 % (FO +LO)	59.78±0.85	81.75±6.05	86.39± 5.42	86.07± 6.65	86.70±3.58	80.14±4.23

Table 2: Mean hen housed egg production (eggs/bird) (±S.E.) of Japanese quail layers as influenced by feeding PUFA rich oil sources from 7 to 26 weeks of age

Treatment groups	7-10 weeks	11-14 weeks	15-18 weeks	19-22 weeks	23-26 weeks	7-26 weeks
T_1- Control	19.17^{cd}±0.80	21.87±0.95	23.49±1.14	23.70±1.91	22.55±1.73	110.77±3.39
T_2- 2% Fish oil (FO)	18.47^{bcd}±0.54	22.83±0.89	25.29±0.73	24.05±1.28	24.22±0.96	114.86±2.27
T_3- 2% Linseed oil (LO)	19.40^{d}±0.89	22.23±2.07	22.60±1.39	21.13±1.32	20.93±0.53	106.30±6.07
T_4- 4% Fish oil	16.10^{ab}±0.21	21.45±0.45	22.54±0.58	22.08±1.22	22.04±1.50	104.21±3.07
T_5- 4% Linseed oil	17.00^{abc}±1.30	21.80±1.96	23.26±1.77	23.85±0.58	24.17±0.31	110.08±5.07
T_6- 2 % (FO +LO)	16.33^{ab}±0.44	22.98±0.78	24.29±0.31	22.93±0.28	22.39±1.18	108.90±1.65
T_7- 4 % (FO +LO)	16.07^{a}±0.77	22.89±1.70	24.19±1.52	22.67±0.46	22.92±0.44	108.73±2.49

^{abcd} Mean values not sharing a common superscript columnwise differ significantly. ($P< 0.05$)

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