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EFFECT OF OMEGA-3 PUFA RICH OIL SOURCES ON EGG QUALITY CHARACTERISTICS OF JAPANESE QUAIL

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Abstract: A study was conducted to assess the egg quality characteristics of Japanese quail upon enrichment of Omega-3 PUFA-Polyunsaturated fatty acid rich oil sources like fish oil and linseed oil, independently and simultaneously at 2 and 4 per cent levels in ration. The mean egg quality characteristics viz. egg weight, shape index, albumen index, yolk index, internal quality unit (IQU), yolk colour and shell thickness of Japanese quail layers were assessed. Based on the results of the study, it was observed that the eggs collected from the group of birds with 4 per cent fish oil (T_4) recorded the highest mean egg weight (14.02 g). However, the eggs collected from the birds in control group recorded the lowest egg weight (13.31 g). Egg quality characteristics were not significantly influenced by the incorporation of various n-3 PUFA rich oil sources at graded level in Japanese quail layer diets.
Keywords: Japanese quail egg, Omega-3 fatty acid, Egg quality traits.

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. In general, Egg quality is a general term which refers to several standards which define both internal and external quality. External quality is focused on egg weight and shape index, whereas internal quality refers to albumen index, yolk index, internal quality unit (IQU), yolk colour and shell thickness. The present study is aimed to assess the external and internal egg quality traits of eggs from Japanese quail layers upon supplementation with dietary Omega-3 PUFA rich oil sources independently and simultaneously at 2 and 4 per cent levels in ration.

MATERIALS AND METHODS

Japanese quail layers were fed with seven experimental diets which were formulated by incorporating different levels of fish oil and linseed oil as follows.

T_1 - Control

T_2 - 2% Fish oil

T_3 - 2 % Linseed oil

T_4 - 4% Fish oil

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T_5 - 4 % Linseed oil

T_6 - 2% (Fish oil +Linseed oil)

T_7 - 4% (Fish oil + Linseed oil)

The mean egg quality characteristics viz. egg weight, shape index, albumen index, yolk index, internal quality unit (IQU), yolk colour and shell thickness of Japanese quail layers from 7th to 26th week of age as influenced by supplementing various PUFA rich oil sources independently and simultaneously in feed were assessed. Eighteen eggs per treatment were randomly collected during the last three days of every 28 day period and were used to measure the egg quality parameters.

RESULTS AND DISCUSSION

Egg quality characteristics

The mean egg quality characteristics viz. egg weight, shape index, albumen index, yolk index, internal quality unit (IQU), yolk colour and shell thickness of Japanese quail layers from 7th to 26th week of age as influenced by supplementing various PUFA rich oil sources independently and simultaneously in feed are presented in Tables 1 and 2, respectively.

Egg weight

From the table, it was observed that the egg collected from the group of birds with 4 per cent fish oil (T_4) recorded the highest mean egg weight (14.02 g). However, the eggs collected from the birds in control group recorded the lowest egg weight (13.31 g).

The statistical analysis revealed no significant difference due to dietary treatments on egg weight. Van Elswyk *et al.* (1992), Balevi and Coskun (2000), Baucells *et al.* (2000), Meluzzi *et al.* (2000) and Tallarico *et al.* (2002) observed non significant difference in egg weight in Japanese quail layers fed n-3 PUFA rich oils at graded level which are in agreement with the results of this study.

Shape index

In this study, the eggs collected from the birds in 2 per cent linseed oil group had the higher shape index values (78.09) followed in descending order when compared to the control eggs. However the eggs collected from the Japanese quail birds in 4 per cent (fish oil + linseed oil) (76.87) recorded numerically lower shape index value than the eggs collected from the birds in control group. Statistical analysis did not reveal any significant difference on shape index due to oil supplementation in feed.

Albumen index

The overall mean albumen index values from 7 to 26 weeks age ranged from 0.128 to 0.134. The statistical analysis failed to reveal any significant difference on albumen index due to PUFA rich oil supplementation in feed.

Yolk index

The overall mean yolk index values ranged from 0.437 to 0.452. The statistical analysis failed to reveal any significant difference on yolk index due to PUFA rich oil supplementation in feed.

Internal quality unit (IQU)

The IQU values in overall 7-26 weeks of age ranged between 93.09 and 94.45 and statistical analysis did not reveal any significant difference due to oil supplementation.

Yolk colour

The yolk colour values in overall 7 to 26 weeks of age ranged from 4.678 to 5.089. On statistical analysis, no significant differences were observed due to PUFA rich oil supplementation.

Shell thickness

The shell thickness values in overall 7 to 26 weeks age ranged between 0.181 mm and 0.184 mm and statistical analysis failed to reveal significant difference between experimental groups. The n-3 PUFA rich lipid source supplementation in this study did not alter the egg shell thickness which is in agreement with the earlier reports of Galobart *et al.* (2001) and Ezhilvalavan (2003).

Table 1

Mean Egg quality characteristics (±S.E.) of Japanese quail layers as influenced by feeding PUFA rich oil sources from 7 to 26 weeks of age

Treatment groups	Shape index	Albumen index	Yolk index	Internal quality unit (IQU)	Yolk colour	Shell thickness (mm)
T_1- Control	77.53±0.37	0.128±0.002	0.443±0.002	93.82±0.36	5.067±0.153	0.181±0.001
T_2-2% Fish oil (FO)	77.65±0.53	0.130±0.002	0.441±0.002	94.04±0.34	5.089±0.105	0.184±0.001
T_3- 2% Linseed oil (LO)	78.09±0.40	0.128±0.004	0.452±0.004	93.21±0.61	4.956±0.070	0.183±0.001
T_4- 4% Fish oil	77.07±0.51	0.130±0.003	0.445±0.003	93.81±0.61	4.911±0.128	0.184±0.001

T_5- 4% Linseed oil	77.67±0.36	0.134±0.003	0.452±0.004	94.45±0.48	4.678±0.155	0.182±0.001
T_6-2 % (FO +LO)	77.50±0.35	0.128±0.002	0.437±0.004	93.09±0.35	4.844±0.159	0.183±0.001
T_7- 4%(FO+LO)	76.87±0.39	0.128±0.003	0.445±0.004	93.82±0.49	4.767±0.110	0.183±0.001

Value within each cell is a mean of six observations

Table 2
Mean Egg weight (±S.E.) (g) 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	19-22weeks	23-26 weeks	Mean
T_1- Control	12.50±0.15	13.75±0.16	13.64±0.41	13.13±0.36	13.53±0.32	13.31±0.19
T_2- 2% Fish oil (FO)	12.58±0.37	13.44±0.32	14.21±0.60	12.95±0.85	13.92±0.42	13.42±0.50
T_3- 2% Linseed oil (LO)	12.50±0.18	13.34±0.24	13.75±0.17	13.87±0.29	14.05±0.08	13.50±0.11
T_4- 4%Fish oil	12.87±0.13	13.80±0.29	14.73±0.20	14.32±0.35	14.38±0.10	14.02±0.07
T_5- 4%Linseed oil	12.60±0.08	13.84±0.38	14.43±0.23	13.90±0.10	14.25±0.09	13.80±0.16
T_6- 2 %(FO +LO)	12.79±0.36	13.59±0.26	13.86±0.23	12.79±0.37	13.77±0.36	13.36±0.27
T_7- 4 %(FO +LO)	12.83±0.54	14.17±0.51	14.39±0.35	13.62±0.39	14.19±0.41	13.84±0.42

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