International Journal of Science, Environment and Technology, Vol. 4, No 2, 2015, 446 – 451

ISSN 2278-3687 (O)
2277-663X (P)

EFFECT OF OMEGA-3 FATTY ACID RICH OIL SOURCES ON CARCASS CHARACTERISTICS IN JAPANESE QUAIL

G. Raj Manohar* and S.C. Edwin
*Assistant Professor, Department of Poultry Science,
Madras Veterinary College,
Chennai-600 007
Tamil Nadu Veterinary and Animal Sciences University
E-mail: rajmanovet@gmail.com (**Corresponding Author*)

Abstract: A study was conducted to assess the Carcass characteristics in Japanese quail upon enrichment of quail diets with Omega-3 fatty acid (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, five hundred and twenty five day old straight-run Japanese quail chicks up to 5 weeks of age. At the end of five weeks growth study, six birds from each treatment group were drawn randomly and subjected to humane method of slaughter. The parameters like eviscerated carcass yield and the giblets weight viz. heart, liver and gizzard were recorded. Breast and thigh meat samples were collected from each carcass and stored at -20ºC for the estimation of sensory evaluation to assess the meat quality characteristics. It is concluded that inclusion of PUFA rich oils at different levels did not alter the carcass characteristics like Ready-to-Cook yield, Eviscerated yield and giblets yield significantly. Similarly, incorporation of fish oil up to four per cent level did not show deterioration in sensory quality of cooked meat and taste panelists accepted the quality in this study.
Keywords: Japanese quail-Omega-3 fatty acids – Carcass characteristics.

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 increasingly gaining momentum in Asian countries especially India. The health promoting effects of dietary Polyunsaturated fatty acids (PUFAs) have provoked considerable interest and effort to enrich animal products using various sources of PUFAs. This has led to the birth of **Designer foods,** which retain their functional, nutritional and sensory qualities but with their lipid composition significantly altered and this is well appreciated by the health conscious consumer. The present study was carried out to study the effect of Omega-3 fatty acid (PUFA) rich oil sources on carcass characteristics of Japanese quail.

*Received Mar 19, 2015 * Published April 2, 2015 * www.ijset.net*

Materials and Methods

The biological experiment was carried out by using five hundred and twenty five, day old straight-run Japanese quail chicks reared up to 5 weeks of age. The birds were wing banded, weighed individually and randomly allotted into 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 25 chicks in each replicate.

The birds were reared under cage system of management with standard management practices throughout the experimental period. The birds were fed with experimental diet *ad libitum* and had free access to wholesome drinking water throughout the experimental period.

At the end of five weeks growth study period, six birds from each treatment group were drawn randomly and subjected to humane method (Mechanical method) of slaughter. The parameters like eviscerated carcass yield and the giblets weight *viz.* heart, liver and gizzard were recorded. Breast and thigh meat samples were collected from each carcass and stored at -20ºC for sensory evaluation to assess the quality characteristics of quail meat.

The organoleptic assessment of Japanese quail meat involved cooking of uniform sized samples of breast muscles at 15 psi for 15 minutes. The cooked breast muscles were served hot separately to a six-member semi trained taste panel. The results were recorded on a nine point hedonic scale with ascending ratings for the desired attributes of appearance, flavour, juiciness, tenderness and overall acceptability (Panda *et al.,* 1982). The data collected were subjected to statistical analyses as per Snedecor and Cochran (1989). Angular transformation is applied to percentages before statistical analysis wherever needed. The non-parametric values were subjected to Kruskal-Wallis non-parametric test (Sokal and Rohlf, 1995).

Results and Discussion

The mean carcass yield of Japanese quail as influenced by supplementing PUFA rich oil sources independently and simultaneously in feed is presented in Table I. The results of this study revealed that the effect of PUFA rich oils at different levels had no significant difference in ready-to-cook yield and eviscerated yield. Also, the effect of PUFA rich oils at different levels did not alter the per cent giblets yield and the weight of heart, gizzard and liver significantly. The reports of several studies, Saricicek *et.al*. (1997), Cortinas *et.al*. (2004) and Lopez-Ferrer *et al*. (2001) also indicated non-significant difference due to n-3

PUFA rich oil source supplementation on ready-to-cook yield of broilers. Lopez-Ferrer *et al*. (1999) reported that the carcass yield values considered on the basis of the carcass weight after feet and head removal were similar among the treatment due to fish oil and linseed oil supplementation in broiler diet.

The mean appearance, flavour, juiciness, tenderness and overall acceptability scores of Japanese quail meat as influenced by supplementing PUFA rich oil sources independently and in combination in feed are presented in Table II. The supplementation of PUFA rich fish and linseed oils at different levels either individually or in combination did not alter the organoleptic characteristics among the treatment groups. Lopez-Ferrer *et al.* (2001*)* stated that broiler meat samples did not show significant difference when supplied with varying levels of linseed oil, which is in agreement with the above research findings.

Lin-Jeun-Horng *et al.* (2002) reported that supplementation of two and four per cent fish oil in broiler diets did not significantly increase fishy flavour of meat samples (or) adversely affect ($P>0.05$) the acceptability of chicken frankfurters which coincides with the results obtained in this study. Bou *et al*. (2004) observed no significant difference in consumer acceptability of meat samples received from the broiler fed diets enriched with 1.25 and 2.50 per cent fish oil after five months of storage at -20ºC or with respect to a freshly cooked commercial sample used as a blind control which is in accordance with the result of this study.

Komprda *et al.* (2003) stated that the enrichment of turkey meat with n-3 PUFA using either fish oil or linseed oil in the amount of 5 per cent of the feed mixture cannot be recommended due to the unacceptable flavour and odour of the product which is not in accordance with the result of the study.

The statistical analysis failed to show significant effect due to dietary treatments on breast meat juiciness score of Japanese quail. The breast meat received from the birds, which received four per cent fish oil, had the numerically highest juiciness score when compared to meats obtained from the other groups.

Though variation was observed in flavour scores in breast meat of Japanese quail, the statistical analysis failed to reveal significant effect due to dietary treatments. However, the breast meat harvested from the birds that received two and four per cent fish oil recorded highest flavour score. Saricicek *et al*. (1997*)* suggested that fish oil can be incorporated up to 0.83 per cent in starter diet ; 1.14 per cent in finisher diet or fish oil can replace up to 25 per cent of the vegetable oil in the diet without affecting the flavour of the meat. Contrary to this

report, the taste panelists of this study accepted the flavour of meat from the birds consumed up to four per cent fish oil in the diet.

The supplementation of n-3 PUFA rich oil sources at graded levels in Japanese quail diet had non significant effect on breast meat tenderness score. However, breast meat from the birds received four per cent fish oil had the highest tenderness score when compared to other treatment groups. The incorporation of n-3 PUFA rich oil sources in Japanese quail diet failed to show significant difference on the overall acceptability score of breast meat. However, the breast meat obtained from the birds received two and four per cent fish oil recorded the highest overall acceptability score when compared to breast meat obtained from the birds that received other treatment groups. Lopez-Ferrer *et al*. (1999*)* reported that the meat samples of broilers fed diets with 8.2 per cent fish oil from zero to five weeks had the poorest sensory quality scores and caused deterioration in the sensory quality of the cooked meat rendering their use unsuitable.

Summary

Based on the research findings, it is concluded that inclusion of PUFA rich oils at different levels did not alter the carcass characteristics like Ready-to-Cook yield, Eviscerated yield and giblets yield significantly. Similarly, incorporation of fish oil up to four per cent level did not show deterioration in sensory quality of cooked meat and taste panelists accepted the quality in this study.

References

[1] Bou, R., Guardiola, F. Tres, A. Barroeta, A.C. and Codony, R. 2004. Influence of dietary fat source, α-tocopherol and ascorbic acid supplementation on sensory quality of dark chicken meat. *Poult. Sci.*,**83**:282-292.

[2] Cortinas, L., Villaverde, C. Galobart, J. Baucells, M.D. Codony, R. and Barroeta, A.C. 2004. Fatty acid content in chicken thigh and breast as affected by dietary polyunsaturation level. *Poult. Sci*., **83:** 1155-1164.

[3] Komprda,T., Zelenka, J. Drobna, Z. Jarosova A. and Faj Moinova, E. 2003. Sensory quality of meat of turkeys fed the diet with sunflower, linseed or fish oil. *Archiv fur Geflugelkunde*, **67**(5): 225-230. (*Poult.Abstr*., 2004, **30**(2) : 424).

[4] Lin-Jeun-Horng, Lin Yuan-Hui and Kuo Chun-Chin, 2002. Effect of dietary fish oil on fatty acid composition, lipid oxidation and sensory property of chicken frankfurters during storage. *Meat Science***, 60**: 161-167.

[5] Lopez-Ferrer,S., Baucells, M.D., Barroeta, A.C. and Grashorn, M.A.1999. n-3 enrichment of chicken meat using fish oil: Alternative substitution with rapeseed and linseed oils. *Poult. Sci.*, **78:** 356 - 365.

[6] Lopez-Ferrer,S., Baucells, M.D., Barroeta, A.C., Galobart, J. and Grashorn, M.A. 2001. n-3 enrichment of chicken meat. 2. Use of precursors of long-chain polyunsaturated fatty acids: Linseed oil. *Poult.Sci.*, **80**: 753 - 761.

[7] Panda, B., Pandey, N.K. Mahapatra, C.M. Verma, S.S. Shrivastav A.K. and Chaudhuri D. 1982. Laboratory manual on post harvest technology of avian products, Avian products technology section, Central Avian Research Institute, Izatnagar, U.P., India.

[8] Saricicek, B.Z., Ocak, N. and Garipoglu, A.V. 1997. A study on utilizing fish oil in broiler diets. *Ziraat Fakultesi Dergisi,* **12**(1):33-42 (*Poult.Abstr.*,1998, **24**(7): 2068).

[9] Snedecor,G.W. and Cochran, W.G. 1989. Statistical methods. 8th ed. Iowa State University Press / Ames, Iowa - 50010.

[10] Sokal, R.R. and Rohlf, F.J. 1995. Biometry: The principles and practices of statistics in biological research.3rd ed., W.H. Freeman and company, New York, pp. 423 – 427.

Table I. Mean carcass yield (±S.E.) (%) of Japanese quail performance as influenced by feeding Omega-3 Fatty acid rich oil sources at 5 weeks of age

Treatment groups	Eviscerated yield / Carcass yield	Heart	Gizzard	Liver	Giblets yield	Ready-to-cook yield
T_1- Control	72.67±0.78	0.85±0.08	2.35±0.15	2.67±0.19	5.87±0.29	78.54±0.72
T_2- 2% Fish oil (FO)	74.07±0.76	0.79±0.07	1.93±0.12	2.46±0.32	5.18±0.26	79.26±0.54
T_3- 2% Linseed oil (LO)	72.32±0.83	0.87±0.06	2.24±0.07	2.73±0.22	5.83±0.22	78.16±0.73
T_4- 4%Fish oil	73.09±0.62	0.92±0.09	2.06±0.12	2.63±0.17	5.61±0.21	78.69±0.82
T_5- 4%Linseed oil	72.00±0.37	0.83±0.09	2.16±0.20	2.38±0.33	5.36±0.23	77.37±0.43
T_6- 2 % (1%FO +1%LO)	72.30±0.62	0.90±0.12	2.44±0.11	2.31±0.21	5.64±0.24	77.94±0.49
T_7- 4 % (2%FO +2%LO)	72.84±0.72	0.77±0.12	2.32±0.16	2.59±0.15	5.68±0.18	78.52±0.63

Value within each cell is a mean of 6 observations

Table II. Mean sensory evaluation values (±S.E.) on breast meat of Japanese quail as influenced by feeding Omega-3 Fatty acid rich oil sources in feed

Treatment groups	Appearance	Flavour	Juiciness	Tenderness	Overall acceptability
T_1- Control	5.83±0.54	6.00±0.37	5.67±0.42	6.00±0.26	5.67±0.33
T_2- 2% Fish oil (FO)	7.00±0.37	7.00±0.52	6.33±0.61	6.83±0.31	6.83±0.40
T_3- 2% Linseed oil (LO)	6.17±0.60	6.17±0.31	6.00±0.37	6.33±0.42	6.33±0.56
T_4- 4% Fish oil	7.17±0.17	7.00±0.49	6.67±0.49	7.00±0.26	6.83±0.48
T_5- 4% Linseed oil	6.83±0.48	6.67±0.33	5.83±0.48	6.33±0.21	6.00±0.26
T_6- 2 % (FO +LO)	6.67±0.49	6.17±0.48	6.00±0.52	6.67±0.42	5.83±0.40
T_7- 4 % (FO +LO)	7.00±0.45	6.83±0.54	6.17±0.17	6.50±0.34	6.17±0.31

Value within each cell is a mean of 6 observations