International Journal of Food, Agriculture and Veterinary Sciences ISSN: 2277-209X (Online)
An Online International Journal Available at http://www.cibtech.org/jfav.htm
2012 Vol. 2 (3) September-December, pp.135-139/Srinivasan and Jeichitra
Research Article

EFFECT OF FEEDING DIFFERENT LEVELS OF SUNFLOWER CAKE AND ENZYME SUPPLEMENTATION ON EGG QUALITY TRAITS OF BREEDER QUAILS

G. Srinivasan and V. Jeichitra
Department of Poultry Science, Madras Veterinary College, Chennai – 600007, India
**Author for Correspondence*

ABSTRACT
The biological trial of twenty-four weeks duration was carried out with 400 adult Japanese quails equally and randomly distributed into ten treatment groups of two replicates. All the quails were housed in multi-tier breeder cages up to thirty weeks of age. The quails in control group were fed corn-soya based diet with no multi-enzyme supplementation. Treatment groups were fed on diets containing 25, 50, 75 and 100 per cent levels of sunflower cake replacing the groundnut cake on an isolysine and isomethionine basis with no multi-enzyme supplementation and, similar treatment groups were fed with multi-enzyme supplementation. The egg quality traits were neither influenced by feeding different levels of SFOC nor by enzyme supplementation indicating that no significant statistical difference could be observed among the traits studied.

Key Words: *Japanese Quails, Sunflower Cake, Multi-Enzyme, Egg quality Traits*

INTRODUCTION
In Japanese quail farming, comparatively higher nutritional requirement, poor feed efficiency, short supply of ingredients, and increase in prices of most of the feed ingredients result in high cost of production. Sunflower oil cake is the cheaper source of vegetable protein than groundnut oil cake and soya and, is also rich in fibre which limits its utilization but could be enhanced through enzyme supplementation. Hence, the present study was undertaken to analyse the effect of Sunflower oil cake on internal egg quality traits viz. shell thickness, albumen index, yolk index and yolk colour (Roche) in Japanese quails at different levels of its inclusion replacing the groundnut oil cake.

MATERIALS AND METHODS
The biological trial of twenty-four weeks duration (7-30 weeks) was carried out with 400 adult Japanese quails were equally and randomly distributed in to ten different treatment groups (T0, T1, T2, T3, T4, T5, T6, T7, T8 and T9) of two replicates belonging to the same age. All the quails were housed in multi-tier Japanese quail breeder cages and standard feeding and other management practices were followed. The per cent ingredient and nutrient composition of the diet for treatment groups are furnished (Table 1). Groundnut oil cake was utilized as a major source of vegetable protein in the control diet which was replaced by sunflower oil cake at graded levels on isolysine (1.3%) and isomethionine (0.5 %) basis according to NRC standards (1977). The dietary treatments were control – T0 corn GNC based diet T1, T2, T3, T4 were 25, 50, 75 and 100 per cent replacement of GNC by SFOC T5 corn GNC based diet with multi enzyme, T6, T7, T8, T9 were 25, 50, 75 and 100 per cent levels replacement of GNC by SFOC with multi enzyme supplementation. Feeding was carried out up to thirty weeks of age. Data on internal egg quality traits viz. shell thickness, albumen index, yolk index and yolk colour (Roche) at four week intervals up to thirty weeks of age were recorded and subjected to analysis of variance as per Snedcor and Cochran (1989).

RESULTS AND DISCUSSION
The shell thickness (mm), albumen index, yolk index and Roche Yolk colour of Japanese quail eggs as influenced by feeding different levels of SFOC with or without enzyme supplementation are presented in Table Numbers 2, 3, 4 and 5 respectively.

Shell Thickness
Irrespective of the enzyme supplementation, inclusion of sunflower oil cake at different levels showed no significant variation in the meal shell thickness of the eggs laid from 7-22 and 27-30 weeks.

Table 1: Composition of the ration

Sr. No.	Ingredients	Control	25%	50%	75%	100%
1	Maize	57	57	57	57	57
2	Deoiled GNC	24	18	12	6	0
3	SFOC	0	6	12	18	24
4	Soyabean meal	5	5	5	5	5
5	Fishmeal	8	8	8	8	8
	Shell grit	4	4	4	4	4
6	Mineral mixture	2	2	2	2	2
7	Vitamin mixture	0.1	0.1	0.1	0.1	0.1
8	Total	100	100	100	100	100
9	CP (%)	21.06	20.40	19.74	19.08	18.42
10	ME (Kcal/kg)	2775	2765	2755	2745	2735
11	Calcium (%)	2.62	2.63	2.63	2.64	2.65
12	Phosphorus (%)	0.37	0.38	0.39	0.40	0.41

The composition of T5 to T9 diets were similar to T0 to T4 respectively except for the addition of 500 gm of enzyme mix per tonne of feed the enzyme contained cellulose 2000, hemicellulase 2500,glucosidase 245, pectinase 850 protease 48000 and amylase 11000 IU per gram

Table 2: Mean Shell thickness (in mm) of layer quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	0.204±	0.186±	0.195±	0.203±	0.198±	0.200±	0.203±	0.200±	0.201±	0.203±	0.188±	0.195±	0.203±	0.195±	0.199±
	0.003	0.002	0.003^{a}	0.001	0.007	0.004^{a}	0.007	0.004	0.006^{a}	0.001	0.004	0.003^{a}	0.007	0.006	0.007^{a}
11-14	0.188±	0.194±	0.191±	0.186±	0.197±	0.191±	0.193±	0.179±	0.186±	0.187±	0.190±	0.188±	0.200±	0.188±	0.190±
	0.003	0.004	0.004^{a}	0.010	0.009	0.010^{a}	0.001	0.004	0.002^{a}	0.002	0.003	0.003^{a}	0.005	0.003	0.004^{a}
15-18	0.181±	0.174±	0.177±	0.179±	0.181±	0.180±	0.185±	0.182±	0.183±	0.175±	0.174±	0.175±	0.177±	0.190±	0.184±
	0.001	0.007	0.004^{a}	0.007	0.019	0.013^{a}	0.004	0.010	0.007^{a}	0.004	0.001	0.003^{a}	0.005	0.001	0.003^{a}
19-22	0.174±	0.196±	0.185±	0.183±	0.191±	0.187±	0.179±	0.199±	0.189±	0.191±	0.198±	0.194±	0.191±	0.191±	0.191±
	0.007	0.002	0.005^{a}	0.002	0.006	0.004^{a}	0.006	0.003	0.005^{a}	0.002	0.004	0.003^{a}	0.007	0.007	0.007^{a}
23-26	0.197±	0.196±	0.197±	0.184±	0.176±	0.180±	0.185±	0.194±	0.189±	0.179±	0.191±	0.185±	0.188±	0.182±	0.185±
	0.002	0.002	0.002^{d}	0.002	0.007	0.005^{abc}	0.007	0.008	0.004^{abcd}	0.002	0.013	0.008^{a}	0.007	0.006	0.007^{ab}
27-30	0.189 ±	0.189 ±	0.189±	0.187 ±	0.188 ±	0.188±	0.189 ±	0.191 ±	0.190±	0.187 ±	0.188 ±	0.188±	0.192 ±	0.186 ±	0.189±
	0.002	0.002	0.002^{a}	0.001	0.004	0.003^{a}	0.006	0.002	0.004^{a}	0.002	0.003	0.003^{a}	0.005	0.005	0.005^{a}

Means bearing the same superscript within classes do not differ significantly.
** (P<0.05), ** (P<0.01)*

Table 3: Mean Albumen Index of layer quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	0.091± 0.003	0.095± 0.003	0.093± 0.003[a]	0.094± 0.001	0.094± 0.003	0.094± 0.002[a]	0.104± 0.004	0.091± 0.004	0.098± 0.004[a]	0.098± 0.002	0.084± 0.004	0.091± 0.003[a]	0.097± 0.005	0.102± 0.003	0.099± 0.004[a]
11-14	0.082± 0.001	0.085± 0.007	0.084± 0.004[a]	0.086± 0.002	0.089± 0.003	0.088± 0.003[a]	0.094± 0.011	0.079± 0.001	0.087± 0.006[a]	0.093± 0.007	0.078± 0.008	0.086± 0.008[a]	0.099± 0.005	0.081± 0.002	0.090± 0.004[a]
15-18	0.070± 0.004	0.072± 0.004	0.071± 0.004[a]	0.069± 0.003	0.074± 0.002	0.072± 0.003[a]	0.072± 0.003	0.070± 0.007	0.071± 0.005[a]	0.071± 0.002	0.074± 0.005	0.073± 0.004[a]	0.070± 0.001	0.067± 0.006	0.069± 0.004[a]
19-22	0.081± 0.001	0.077± 0.003	0.079± 0.002[a]	0.076± 0.005	0.075± 0.008	0.075± 0.007[a]	0.072± 0.001	0.075± 0.005	0.074± 0.003[a]	0.077± 0.004	0.075± 0.005	0.076± 0.005[a]	0.081± 0.003	0.076± 0.001	0.070± 0.002[a]
23-26	0.091± 0.001	0.087± 0.001	0.089± 0.001[c]	0.087± 0.003	0.083± 0.002	0.085± 0.003[ab]	0.088± 0.001	0.082± 0.002	0.084± 0.002[a]	0.090± 0.011	0.085± 0.001	0.088± 0.006[abc]	0.086± 0.002	0.086± 0.006	0.086± 0.004[c]
27-30	0.082 ± 0.003	0.083± 0.001	0.083± 0.002[c]	0.082 ± 0.002	0.082± 0.003	0.082± 0.003[a]	0.086 ± 0.003	0.079± 0.001	0.083± 0.002[a]	0.086 ± 0.003	0.080± 0.001	0.083± 0.002[bc]	0.087 ± 0.006	0.082± 0.001	0.085± 0.004[ab]

Means bearing the same superscript within classes do not differ significantly.
** (P<0.05), ** (P<0.01)*

Table 4: Mean Yolk Index of layer quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	0.414± 0.003	0.431± 0.014	0.422± 0.008[a]	0.426± 0.018	0.449± 0.003	0.437± 0.001[ab]	0.438± 0.001	0.452± 0.002	0.445± 0.007[b]	0.445± 0.015	0.430± 0.008	0.437± 0.001[ab]	0.443± 0.016	0.452± 0.014	0.447± 0.001[b]
11-14	0.361± 0.001	0.389± 0.009	0.375± 0.005[a]	0.384± 0.002	0.386± 0.008	0.385± 0.005[a]	0.369± 0.018	0.375± 0.005	0.372± 0.001[a]	0.375± 0.007	0.393± 0.017	0.384± 0.001[a]	0.373± 0.002	0.375± 0.011	0.374± 0.006[a]
15-18	0.417± 0.018	0.422± 0.004	0.419± 0.011[a]	0.419± 0.010	0.426± 0.009	0.422± 0.009[a]	0.423± 0.006	0.454± 0.005	0.438± 0.006[a]	0.427± 0.008	0.432± 0.002	0.429± 0.004[a]	0.387± 0.025	0.431± 0.010	0.409± 0.018[a]
19-22	0.471± 0.008	0.434± 0.006	0.456± 0.007[a]	0.456± 0.004	0.467± 0.016	0.461± 0.010[a]	0.467± 0.001	0.443± 0.012	0.455± 0.007[a]	0.449± 0.001	0.465± 0.001	0.457± 0.001[a]	0.463± 0.019	0.462± 0.004	0.463± 0.011[a]
23-26	0.434± 0.120	0.431± 0.006	0.432± 0.063[b]	0.394± 0.002	0.418± 0.008	0.406± 0.005[b]	0.427± 0.030	0.408± 0.001	0.417± 0.015[ab]	0.427± 0.004	0.428± 0.012	0.428± 0.008[ab]	0.412± 0.013	0.416± 0.005	0.414± 0.009[ab]
27-30	0.419± 0.008	0.421± 0.001	0.420± 0.004[a]	0.416± 0.008	0.429± 0.005	0.422± 0.006[a]	0.425± 0.004	0.426± 0.003	0.426± 0.004[a]	0.424± 0.002	0.430± 0.009	0.427± 0.005[a]	0.415± 0.008	0.427± 0.007	0.421± 0.008[a]

*Superscript within classes does not differ significantly. * (P<0.05), ** (P<0.01)*

Table 5: Mean Roche Yolk Colour of layer quails

Age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	7.75±	6.95±	7.35±	8.05±	7.80±	7.93±	7.08±	6.12±	6.60±	7.50±	7.61±	7.56±	7.30±	7.99±	7.65±
	0.25	0.15	0.20[a]	0.45	1.20	1.25[a]	1.30	0.37	0.84[a]	0.50	0.05	0.28[a]	0.50	0.16	0.33[a]
11-14	7.55±	6.25±	6.90±	6.80±	6.75±	6.78±	6.65±	6.85±	6.75±	7.60±	6.80±	7.20±	7.85±	6.55±	6.70±
	0.25	0.25	0.25[a]	0.20	0.05	0.13[a]	0.35	0.25	0.30[a]	0.80	0.20	0.50[a]	0.25	0.25	0.31[a]
15-18	6.40±	6.20±	6.30±	6.25±	6.50±	6.38±	6.35±	6.05±	6.20±	6.45±	6.30±	7.38±	6.31 ±	6.30±	6.31±
	0.60	0.10	0.35[a]	0.25	0.01	0.13[a]	0.25	0.05	0.13[a]	0.15	0.50	0.33[a]	0.01	0.20	0.10[a]
19-22	6.66±	6.83±	6.75±	6.33±	6.58±	6.46±	7.15±	6.41±	6.78±	6.75±	6.75±	6.75±	7.16±	6.49±	6.83±
	0.33	0.67	0.50[a]	0.17	0.42	0.29[a]	0.15	0.25	0.20[a]	0.75	0.25	0.50[a]	0.01	0.16	0.08[a]
23-26	6.65±	6.05±	6.35±	6.20±	6.25±	6.23±	6.55±	6.90±	6.73±	6.66 ±	6.40±	6.53±	5.75±	6.80±	6.28±
	0.35	0.05	0.20[a]	0.40	0.75	0.58[a]	0.05	0.60	0.33[a]	0.01	0.40	0.20[a]	0.25	0.20	0.23[a]
27-30	6.95±	6.48±	6.72±	6.70±	6.80±	6.75±	6.90±	6.45±	6.68±	7.00±	6.75±	6.88±	6.80±	6.80±	6.80±
	0.05	0.18	0.17[a]	0.01	0.50	0.25[a]	0.30	0.15	0.23[a]	0.10	0.05	0.08[a]	0.10	0.80	0.45[a]

Means bearing the same superscript within classes do not differ significantly.
* ($P<0.05$), ** ($P<0.01$)

However, the mean shell thickness of the eggs laid during 23-26 weeks varied significantly with varied trend of inclusion of sunflower oil cake in the diet. Irrespective of the level of inclusion the mean shell thickness of the eggs collected during 11-18 and 27-30 weeks did not show any significant effect and for the eggs collected in the rest of the period it was significant.

Albumen Index

Irrespective of the enzyme supplementation, the level of inclusion of sunflower oil cake in the diet did not influence significantly the mean albumen index of the eggs laid during 7-22 weeks of age whereas eggs laid during the period of 23-30 weeks were significantly influenced.

Irrespective of the level of inclusion the enzyme supplementation significantly reduced the mean albumen index in Japanese quail eggs laid between 11-14 and 19-30 weeks of age. Though the mean albumen index did not vary significantly between 7-10 and 15-18 weeks the mean albumen index was the lowest with enzyme supplementation.

Yolk Index

Irrespective of the enzyme supplementation, the mean yolk index of the eggs lay during 11-22 and 27-30 weeks did not vary significantly with various levels of inclusion of SFOC. On the other hand the mean yolk index of the eggs laid during 7-10 and 23-26 weeks of age varied significantly. Irrespective of the level of inclusion the enzyme supplementation significantly increased the mean yolk index in Japanese quail eggs laid between 7-18 and 27-30 weeks of age but did not influence the mean yolk index values during 19-26 weeks of age.

Roche Yolk Colour

Irrespective of the enzyme supplementation, the different level of inclusion of SFOC did not influence the mean Roche yolk colour of the eggs. Irrespective of the level of inclusion the mean Roche yolk colour of the eggs laid during 11-14 and 27-30 weeks were decreased significantly with enzyme supplementation. However, the mean Roche yolk colour of the eggs lay during 7-10 and 15-26 weeks of age did not vary significantly with enzyme supplementation.

In general, the egg quality traits were neither influenced by feeding greater levels of SFOC nor by enzyme supplementation indicating that no significant statistical difference could be observed among the traits studied. Similar observations were reported by Mirza *et al.,* (1993) and contrary findings were furnished by Karunajeew *et al.,* (1987) with respect to albumen height in White Leghorns.

REFERENCES

NRC (1977). Number 1: Nutrient Requirements of Poultry 8th edition *National Academy of Sciences* Washington DC 43-46.

Karunajeewa H, Abu Serewa S, Tham SH and Eason P (1987). The effect of dietary levels of sunflower seeds and lysine on egg quality and laying performance of White Leghorn hens. *Australia Science Food and Agriculture* **41**(4) 325.

Mirza MA, Sial MA and Mirza AM (1993). Sunflower meal as a major vegetable protein source in layer ration. *Archieves of Animal Nutrition* **42**(3/4) 273.

Snedecor SW and WG Cochran (1989). Statistical Methods Eight Edition Iowa state university Press, USA.