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Research Article

UTILIZATION OF SUNFLOWER CAKE AND ENZYME SUPPLEMENTATION ON PRODUCTION PERFORMANCE OF BREEDER QUAILS

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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 significant ($P<0.05$, $P<0.01$) differences were noticed between the treatments for hen-housed and hen-day egg production from 7-30 weeks of age. Quails performed better on complete replacement levels at all age intervals. The enzyme supplementation did not influence the hen-housed and hen-day egg production. The means for feed efficiency per dozen eggs was significantly ($P<0.05$ and $P<0.01$) influenced by the treatments. Similarly, feed efficiency per kg egg mass was influenced significantly by the treatments except during 7-10 and 11-14 weeks age intervals. Enzyme supplementation in feed efficiency did not show uniform pattern.

Key Words: *Japanese Quails, Sunflower Cake, Multi-Enzyme, Egg production 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 analyze the effect of Sunflower oil cake on hen-housed, hen-day egg production and feed efficiency (per dozen eggs and per kg egg mass) 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 hen-housed and, hen-day egg production and feed efficiency (per dozen eggs and per kg egg mass) 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 means hen-housed and hen-day egg production from 7-30 weeks of age (Table 2 and Table 3) in different treatments showed significant variation (P<0.05 and P<0.01). Enzyme supplementation showed a non-significant effect on hen-housed and hen-day egg production at all age intervals except for 7-10 weeks age interval. It was also observed that quails can perform better even on complete replacement levels of sunflower cake with groundnut oil cake. The total replacement of groundnut oil cake with sunflower oil cake resulted in higher hen-housed and hen-day egg production. The gradual increase in egg production at graded levels of incorporation of sunflower cake was observed. These results are in accordance with the findings of Singh and Prasad (1978), Elangovan *et al.*, (2000) and Shrivastav and Johri (2005).

The means for feed efficiency per dozen eggs was significantly (P<0.05 and P<0.01) influenced by the treatments. Similarly, feed efficiency per kg egg mass was influenced significantly by the treatments except during 7-10 and 11-14 weeks age intervals. Enzyme supplementation in feed efficiency per dozen eggs was found to be significant only for 7-10 weeks age interval whereas, in per kg egg mass, it is significant for 11-14 and 27-30 weeks age intervals. The feed efficiency did not show uniform pattern. These findings are in accordance with Shrivatsava (1977) and Elangovan *et al.*, (2000).

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 Hen-Housed egg production performance of breeder quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	9.02 ± 0.03	7.94 ± 0.72	8.48 ± 0.87^{ab}	9.02 ± 0.23	6.05 ± 1.29	7.53 ± 1.26^{a}	13.12 ± 0.53	12.73 ± 1.56	12.92 ± 1.04^{ab}	15.21 ± 2.87	4.74 ± 0.41	9.97 ± 1.64^{ab}	16.63 ± 1.58	8.62 ± 0.81	12.62 ± 1.19^{ab}
11-14	65.	56.	61.2	52.	63.	58.0	65.	56.	61.1	65.	69.	67.5	65.	70.	67.8

	54 ± 2.94	97 ± 7.31	5 ± 5.12[a]	81 ± 5.67	19 ± 1.09	0 ± 3.38[a]	39 ± 3.93	86 ± 9.69	2 ± 6.81[a]	86 ± 4.26	22 ± 7.31	4 ± 5.78[a]	65 ± 3.99	05 ± 0.86	5 ± 2.42[a]
15-18	66.07 ± 1.36	64.85 ± 8.90	65.46 ± 5.13[a]	64.62 ± 7.47	67.53 ± 1.27	66.07 ± 4.37[ab]	70.09 ± 2.80	77.80 ± 2.80	73.94 ± 2.80[c]	69.41 ± 7.06	76.84 ± 5.81	73.12 ± 4.38[c]	77.14 ± 5.00	72.91 ± 0.97	75.02 ± 2.98[a]
19-22	62.92 ± 1.99	53.41 ± 8.86	58.16 ± 5.42[a]	60.67 ± 4.06	63.29 ± 4.56	61.98 ± 4.31[ab]	64.59 ± 1.10	72.09 ± 6.50	68.34 ± 3.80[a]	66.04 ± 3.76	72.28 ± 5.01	69.16 ± 4.38[b]	71.96 ± 5.89	69.72 ± 0.59	70.84 ± 3.24[a]
23-26	63.02 ± 2.10	45.48 ± 2.96	54.25 ± 2.53[a]	53.68 ± 4.57	58.67 ± 3.71	56.17 ± 4.14[a]	58.20 ± 1.04	68.16 ± 1.07	63.18 ± 1.05[a]	61.38 ± 0.67	61.03 ± 7.69	61.20 ± 4.18[a]	69.10 ± 2.32	66.62 ± 6.27	67.86 ± 4.29[a]
27-30	55.87 ± 7.77	37.89 ± 2.01	46.88 ± 4.89[a]	51.49 ± 3.64	47.97 ± 3.93	49.73 ± 3.78[abc]	40.21 ± 0.74	58.91 ± 1.18	49.56 ± 0.96[ab]	61.07 ± 11.97	68.10 ± 9.18	64.58 ± 1.57[bcd]	64.93 ± 1.84	71.18 ± 3.55	68.05 ± 2.69[a]

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

Table: 3 Hen-Day egg production performance of breeder quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	9.16 ± 0.12	7.98 ± 0.68	8.57 ± 0.90[ab]	9.34 ± 1.56	6.36 ± 1.34	7.85 ± 1.45[a]	13.33 ± 0.32	18.03 ± 9.26	15.68 ± 4.79[a]	15.21 ± 2.87	9.79 ± 0.46	12.50 ± 1.67[abc]	17.80 ± 1.04	8.92 ± 1.10	13.36 ± 1.07[abc]
11-14	67.50 ± 0.98	59.73 ± 4.95	63.62 ± 2.97[ab]	54.62 ± 3.86	67.28 ± 1.56	60.95 ± 2.71[a]	69.30 ± 0.02	69.03 ± 7.50	69.17 ± 3.76[bc]	66.07 ± 4.05	74.71 ± 1.82	70.39 ± 2.94[bc]	77.54 ± 0.46	73.02 ± 3.35	75.28 ± 1.91[c]
15-18	70.77 ± 2.18	73.03 ± 8.18	71906 ± 6.68[a]	73.82 ± 0.09	75.97 ± 0.11	74.89 ± 0.10[ab]	76.58 ± 3.68	80.90 ± 5.90	78.74 ± 4.79[ab]	71.64 ± 4.98	86.99 ± 4.33	79.32 ± 4.66[ab]	92.61 ± 2.43	80.97 ± 2.19	86.79 ± 2.31[b]
19-22	67.	58.	62.9	71.	72.	72.0	71.	79.	75.2	68.	82.	75.3	97.	74.	82.7

	12 ± 3.10	72 ± 9.47	2 ± 6.29[a]	50 ± 6.77	54 ± 3.87	2 ± 5.32[ab]	33 ± 5.78	18 ± 8.45	6 ± 7.12[ab]	11 ± 1.69	66 ± 3.76	9 ± 2.73[ab]	86 ± 0.54	73 ± 0.27	9 ± 2.14[b]
23-26	72.19 ± 1.01	57.66 ± 8.44	64.93 ± 4.73[a]	66.15 ± 4.00	74.56 ± 2.59	70.36 ± 3.29[ab]	78.49 ± 1.92	70.71 ± 3.62	74.60 ± 1.14[ab]	63.45 ± 1.88	74.46 ± 0.54	68.96 ± 1.21[ab]	91.40 ± 0.62	74.19 ± 3.66	84.79 ± 2.14[b]
27-30	62.15 ± 5.47	55.84 ± 1.28	58.989 ± 9.16[ab]	68.92 ± 5.06	62.98 ± 3.06	65.95 ± 6.59[abc]	49.33 ± 0.36	66.37 ± 7.49	57.85 ± 7.93[a]	67.60 ± 6.09	79.50 ± 3.74	73.55 ± 7.97[bcd]	90.71 ± 4.68	83.00 ± 5.51	86.86 ± 5.09[d]

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

Table: 4 Feed efficiency (kg of feed per dozen eggs) of breeder quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	1.86 ± 0.06	4.64 ± 3.36	3.25 ± 1.71[b]	1.49 ± 0.44	3.01 ± 0.64	2.25 ± 0.54[ab]	1.32 ± 0.03	1.39 ± 0.75	1.36 ± 0.39[a]	1.16 ± 0.21	3.64 ± 0.25	1.36 ± 0.39[a]	1.78 ± 1.18	2.06 ± 0.19	1.92 ± 0.69[ab]
11-14	0.34 ± 0.01	0.40 ± 0.04	0.37 ± 0.03[a]	0.42 ± 0.03	0.34 ± 0.01	0.38 ± 0.02[a]	0.34 ± 0.01	0.34 ± 0.04	0.34 ± 0.03[a]	0.35 ± 0.03	0.32 ± 0.02	0.34 ± 0.03[a]	0.31 ± 0.02	0.32 ± 0.02	0.32 ± 0.02[a]
15-18	0.42 ± 0.02	0.41 ± 0.05	0.42 ± 0.06[b]	0.40 ± 0.01	0.39 ± 0.01	0.40 ± 0.01[ab]	0.38 ± 0.02	0.36 ± 0.03	0.37 ± 0.03[ab]	0.41 ± 0.03	0.33 ± 0.01	0.37 ± 0.03[ab]	0.29 ± 0.01	0.37 ± 0.01	0.33 ± 0.01[a]
19-22	0.42 ± 0.03	0.49 ± 0.10	0.46 ± 0.06[c]	0.39 ± 0.03	0.37 ± 0.01	0.38 ± 0.02[ab]	0.40 ± 0.04	0.39 ± 0.05	0.39 ± 0.04[b]	0.42 ± 0.01	0.35 ± 0.02	0.39 ± 0.04[b]	0.31 ± 0.02	0.37 ± 0.01	0.34 ± 0.02[a]
23-26	0.42 ± 0.03	0.56 ± 0.07	0.49 ± 0.05[d]	0.42 ± 0.04	0.41 ± 0.01	0.42 ± 0.03[b]	0.45 ± 0.05	0.39 ± 0.01	0.42 ± 0.03[abcd]	0.46 ± 0.02	0.37 ± 0.01	0.42 ± 0.03[abcd]	0.29 ± 0.01	0.39 ± 0.02	0.34 ± 0.02[a]
27-30	0.44 ± 0.01	0.52 ± 0.14	0.48 ± 0.08[b]	0.43 ± 0.07	0.46 ± 0.02	0.45 ± 0.05[ab]	0.60 ± 0.10	0.37 ± 0.08	0.49 ± 0.09[ab]	0.42 ± 0.09	0.36 ± 0.01	0.49 ± 0.09[ab]	0.31 ± 0.02	0.33 ± 0.02	0.32 ± 0.02[a]

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

Table: 5 Feed efficiency (kg of feed per kg of eggs) of breeder quails

age intervals (weeks)	T0	T5	Pooled	T1	T6	Pooled	T2	T7	Pooled	T3	T8	Pooled	T4	T9	Pooled
7-10	2.75 ± 0.19	4.40 ± 1.96	3.58 ± 1.08[a]	3.27 ± 1.88	1.86 ± 0.77	2.57 ± 1.83[a]	4.68 ± 0.39	3.55 ± 1.95	4.12 ± 1.17[a]	4.64 ± 1.66	1.19 ± 0.42	2.92 ± 0.90[a]	1.91 ± 0.67	2.06 ± 0.10	1.99 ± 0.39[a]
11-14	3.09 ± 0.13	3.21 ± 0.16	3.15 ± 0.15[a]	4.10 ± 0.39	3.14 ± 0.09	3.62 ± 0.24[a]	3.91 ± 0.81	3.24 ± 0.18	3.58 ± 0.18[a]	3.39 ± 0.09	2.89 ± 0.26	3.14 ± 0.18[a]	2.92 ± 0.27	2.94 ± 0.19	2.93 ± 0.23[a]
15-18	3.72 ± 0.30	3.80 ± 0.37	3.76 ± 0.34[a]	3.42 ± 0.07	3.53± 0.06	3.48 ± 0.07[a]	3.23 ± 0.06	3.11 ± 0.21	3.17 ± 0.14[a]	3.48± 0.50	3.08 ± 0.16	3.28 ± 0.33[a]	2.47 ± 0.22	3.51 ± 0.22	2.99 ± 0.22[a]
19-22	4.50 ± 0.02	4.91 ± 1.52	4.71 ± 0.77[d]	3.92 ± 0.47	3.72 ± 0.27	3.82 ± 0.37[ab]	4.28 ± 0.16	3.48 ± 0.36	3.88 ± 0.26[abc]	4.51 ± 0.32	3.75 ± 0.10	4.13 ± 0.21[bcd]	3.27 ± 0.33	3.56 ± 0.24	3.42 ± 0.29[a]
23-26	4.24± 0.25	5.76± 0.58	5.00 ± 0.42[b]	4.53 ± 0.72	4.45 ± 0.07	4.49 0.39[b]	4.67 ± 0.54	4.20 ± 0.21	4.44 ± 0.38[b]	4.54 ± 0.01	3.78 ± 0.03	4.16 ± 0.02[ab]	3.05 ± 0.06	3.93 ± 0.25	3.49 ± 0.16[a]
27-30	4.23± 0.22	5.09± 1.50	4.66 ± 0.86[ab]	4.23 ± 0.78	4.00 ± 0.04	4.12 ± 0.41[ab]	6.32 ± 0.30	4.09 ± 1.38	4.21 ± 0.84[b]	5.04 ± 0.99	3.60 ± 0.18	4.32 ± 0.59[ab]	3.05 ± 0.15	3.09 ± 0.30	3.07 ± 0.23[a]

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

REFERENCES

Elangovan AV Verma SVS and Sastry VRB (2000). Response of growing and laying Japanese quails (Coturnix japonica) to dietary sunflower seed meal. *Asian-Australasian Journal of Animal Science.* **13**(12) 1726-1730.

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

Shrivatsava HK (1977). Studies on the nutritive value and utilization of sunflower seed oil meal in White Leghorns. Ph.D. Thesis submitted to Agra University, Agra.

Shrivatsava AK and Johri TS (2005). Effect of replacing soybean meal protein with sunflower seed meal in iso-nitrogenous diets on the performance of laying quails. *Indian Journal of Poultry Science.* **40**(2) 179-183.

Singh KS and CM Prasad (1978). Effect of replacement of dietary groundnut cake with sunflower cake on performance of crossbred starter chicks. *Indian Journal of Poultry Science.* **10**(2) 185.

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