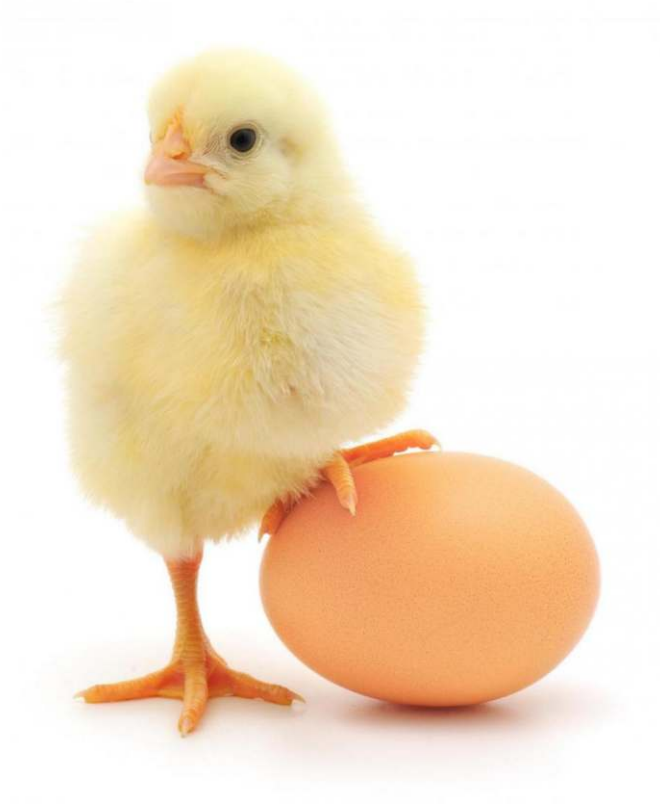
ISSN 1682-8356
ansinet.org/ijps



INTERNATIONAL JOURNAL OF

POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 8 (8): 775-778, 2009
ISSN 1682-8356

Performance of Single Comb White Leghorn Layers Fed with *Aloe vera, Curcuma longa* (Turmeric) and Probiotic

M. Moorthy, S. Saravanan, C. Mehala, S. Ravi, M. Ravikumar, K. Viswanathan and S.C. Edwin
Department of Poultry Science, Veterinary College and Research Institute,
Namakkal, 637 002, Tamil Nadu, India

Abstract: Two hundred and eighty commercial layer chicks belonging to single hatch were purchased from local hatchery, wing banded, weighed and randomly allotted into seven treatment groups with four replicates of ten chicks each. The chicks were reared in cages in a gable roofed, open sided house. All the chicks were provided with uniform floor, feeder and waterer space and were reared under standard management conditions throughout the experimental period. The experimental diet was formulated according to the standards prescribed in Bureau of Indian Standards (B.I.S., 1992). The treatment groups were T_1-Control; T_2-0.1% *aloe vera*; T_3-0.1% turmeric; T_4-0.1% probiotic; T_5-0.1% *aloe vera* + 0.1% turmeric; T_6-0.1% *aloe vera* + 0.1% probiotic and T_7-0.1% turmeric + 0.1% probiotic powder. There was no significant difference in feed consumption. Hen housed egg production, hen day egg production and return over feed cost differ significantly after 40 weeks of age during the experimental period. The overall mean per cent broken eggs differ significantly ($p<0.05$) among treatment groups but no significant difference was observed in overall mean feed conversion ratio per dozen eggs during the experimental period.

Key words: White leghorn, egg production, turmeric, aloe vera and probiotic

INTRODUCTION

Aloe vera and *Curcuma longa* (Turmeric) are the two medicinal plants found in tropical regions of India and are commonly incorporated in most of the poultry herbal medicines like liver tonics, anti-stress, antioxidants, antitoxic and growth promoting preparations. Apart from these benefits, these two herbs are used for various functions like antibacterial, antiseptic, anti-inflammatory, nematocidal and immunomodulatory properties.

Besides, usage of these herbs for medicinal preparations, it can also be included in the poultry diet as feed additive to utilize their benefits to the maximum extent.

MATERIALS AND METHODS

Two hundred and eighty commercial layer chicks belonging to single hatch were purchased from local hatchery, wing banded, weighed and randomly allotted into seven treatment groups with four replicates of ten chicks each. The chicks were reared in cages in a gable roofed, open sided house. All the chicks were provided with uniform floor, feeder and waterer space and were reared under standard management conditions throughout the experimental period.

Experimental diet: The experimental diet was formulated according to the standards prescribed in Bureau of Indian Standards (B.I.S., 1992). *Aloe vera*, *Curcuma longa* and probiotic powder was included in the basal diet and the following experimental groups were formed.

Treatments	Experimental diets
T_1	Control
T_2	0.1% *Aloe vera* powder
T_3	0.1% *Curcuma longa* powder
T_4	0.1% probiotic powder
T_5	0.1% *Aloe vera* + 0.1% *Curcuma longa* powder
T_6	0.1% of *Aloe vera* and 0.1% of Probiotic powder
T_7	0.1% of *Curcuma longa* + 0.1% Probiotic powder

The diets were fed *ad libitum* to the birds through out the experimental period.

The diets were subjected to proximate analysis as per AOAC (1995). The ingredients and nutrient composition of the experimental diet are presented in Table 1.

Collection of data: Data on body weight, feed consumption and egg production were recorded at weekly intervals and mortality was recorded at occurrence. From the above data feed efficiency and livability were calculated.

Feed consumption: Feed consumption of all the treatment groups were recorded for every 28 days period and the mean total feed consumption per bird per day were calculated.

Egg production: During experimental period, the egg production was recorded daily. Based on data, egg production was calculated in terms of hen day (percent) and hen housed (number).

Table 1: Ingredients and nutrient composition (% DM) of experimental diets

Ingredients	Layer diet
Maize	48
Extracted sunflower meal	12
Extracted groundnut meal	9
Soybean meal	16
Fish meal	5.1
Calcite	4
Shell grit	5
Di-calcium Phosphate	0.9
Total	100
Supplements	
Vitamins AB_2D_3K[1]	0.010
B-Complex[2]	0.020
Trace minerals[3]	0.100
Nutrient composition (percent)	
Crude protein	18.45
Crude fibre	5.23
Ether extract	2.56
Nitrogen Free Extract	58.95
Total ash	12.52
Acid Insoluble Ash	1.57
Calcium	3.78
Total phosphorus	0.79
Lysine*	0.72
Methionine*	0.41
Metabolizable Energy* (kcal/kg)	2695

[1]One gram of vitamin AB_2D_3K supplement contained 82500 IU of vitamin-A, 50 mg of vitamin-B_2, 12000 IU of vitamin-D_3 and 10 mg of vitamin-K. [2]One gram of B-complex supplement contained 80 mg of vitamin-B_1, 16 mg of vitamin-B_6, 80 mcg of vitamin-B_{12}, 80 mg of vitamin-E, 120 mg of niacin, 8 mg of folic acid, 80 mg of calcium pantothenate and 86 mg of calcium. [3]One gram of trace minerals contained 54 mg of manganese, 52 mg of zinc, 20 mg of iron, 2 mg of iodine and 1 mg of cobalt, *Calculated values

Feed conversion ratio: Feed conversion ratio was calculated and expressed as kg feed consumed to produce one dozen eggs.

Livability: The mortality of birds was recorded on its occurrence during the experimental period and livability percentage was worked out.

Return over feed cost: The return over feed cost from Single Comb White Leghorn layers fed diet with different levels of extracted coconut meal was calculated based upon the actual prevailing feed and egg cost during the study.

Return over feed cost = Value of eggs produced by a bird during 28 days period - Cost of feed consumed by a bird during 28 days period.

Statistical analysis: The data collected on various parameters were subjected to statistical analysis using Completely Randomized Design (CRD) as per the methods suggested by Snedecor and Cochran (1989). Angular transformation was applied to percentages wherever needed.

RESULTS AND DISCUSSION

Feed consumption: The statistical analysis revealed that there is no significant difference in feed consumption between treatment groups (Table 2). This might be due to feeding isocaloric and isonitrogeous diet throughout the experimental period. The overall feed consumption was numerically high in birds fed with probiotic and turmeric compared to other treatment groups. This was contrary to the findings of Al-Sultan (2003) and Durrani *et al*. (2006) who observed that feeding turmeric and probiotic reduced feed consumption.

Hen housed egg production: Significant difference was noticed in hen housed egg production after 33 weeks of age (Table 3). The overall hen housed egg production was significantly ($p<0.05$) lower in birds fed with probiotic and turmeric compared to other treatment groups. Hen housed egg production in *aloe vera* fed groups either alone and in combination differ significantly ($p<0.05$) when compared to control.

Hen day egg production: The per cent hen day egg production (Table 4) differ significantly during 33-35 weeks and after 41 weeks of age. The overall mean hen day egg production T_1, to T_6 did not differ significantly but hen day egg production was significantly ($p<0.05$) lower in T_4 compared to control.

Broken eggs: There was no significant difference in per cent broken eggs (Table 5) throughout the experimental period in all treatment groups. The overall mean broken

Table 2: Mean (±S.E.) feed consumption (g/bird/day) of Single Comb White Leghorn layers fed diet with different levels of *Aloe vera*, *Curcuma longa* (Turmeric), Probiotic and its combinations

Age (weeks)	T_1	T_2	T_3	T_4	T_5	T_6	T_7
21-24	101.20±0.96	103.03±1.59	108.98±0.57	104.71±1.58	102.03±1.53	98.10±0.96	111.81±1.10
25-28	109.68±1.08	111.66±0.38	105.18±0.13	102.37±1.25	101.60±0.38	99.58±1.08	108.92±3.42
29-32	100.18±3.93	112.68±3.87	113.53±2.22	101.76±0.78	102.62±3.87	100.08±3.93	110.17±5.22
33-36	109.67±0.89	109.24±3.42	109.57±2.59	108.18±3.01	109.94±3.42	106.67±0.89	115.74±6.30
37-40	108.70±1.32	102.58±0.22	106.00±0.77	115.93±1.91	112.90±0.91	111.70±1.32	116.28±0.73
41-44	1033.42±0.42	104.28±0.42	113.02±0.47	115.26±1.72	114.03±0.42	113.42±0.42	113.76±4.00
45-48	104.25±0.17	104.59±0.52	109.00±0.18	115.17±1.30	114.44±0.52	114.25±0.17	115.18±0.90
49-52	107.78±0.36	114.26±1.33	114.97±0.18	114.93±2.42	114.26±1.33	114.78±0.36	115.59±0.51
Overall (21-52)	109.32±4.58	108.98±2.56	109.76±2.96	110.74±3.85	108.98±3.79	107.32±4.58	110.93±4.13

Each value is a mean of three observations

Table 3: Mean (±S.E.) hen housed egg production (eggs/hen) of Single Comb White Leghorn layers fed diet with different levels *of Aloe vera, Curcuma longa* (Turmeric), Probiotic and its combinations

Age (weeks)	T_1	T_2	T_3	T_4	T_5	T_6	T_7
21-24	24.42±0.73	26.22±0.37	25.64±0.10	25.25±0.29	25.22±0.37	23.42±0.73	24.28±0.62
25-28	23.44±0.32	24.78±0.43	24.89±0.15	26.11±0.19	25.78±0.43	25.44±0.32	24.86±0.39
29-32	24.56±0.17	27.31±0.12	27.06±0.26	26.22±0.12	26.31±0.12	25.56±0.17	24.61±0.86
33-36	25.36^{a}±0.17	26.11^{ab}±0.18	25.92^{ab}±0.24	25.61^{b}±0.10	26.11^{ab}±0.18	26.36^{a}±0.17	25.33^{b}±0.27
37-40	26.11^{a}±0.07	26.08^{ab}±0.05	25.97^{abc}±0.25	25.28^{bc}±0.14	26.08^{ab}±0.05	26.11^{a}±0.07	25.25^{c}±0.27
41-44	26.08^{A}±0.05	26.06^{A}±0.07	25.81^{A}±0.16	25.26^{B}±0.10	26.06^{A}±0.07	26.08^{A}±0.05	25.17^{B}±0.05
45-48	25.92^{A}±0.08	26.03^{A}±0.12	25.78^{A}±0.11	25.23^{B}±0.08	26.03^{A}±0.12	25.92^{A}±0.08	25.08^{B}±0.05
49-52	25.61^{A}±0.10	25.67^{A}±0.19	25.33^{AB}±0.08	24.81^{BC}±0.10	25.67^{A}±0.19	25.61^{A}±0.10	24.56^{c}±0.07
Overall (21-52)	203.50^{b}±1.25	207.26^{a}±1.55	205.40^{ab}±2.01	203.77^{b}±1.74	207.26^{a}±1.55	203.50^{b}±1.25	199.14^{c}±2.05

Each value is a mean of three observations, $^{a-c}$Means within a row with no common superscript differ significantly ($p<0.05$),
$^{A-C}$Means within a row with no common superscript differ significantly ($p<0.01$)

Table 4: Mean (±S.E.) percent hen day egg production of Single Comb White Leghorn layers fed diet with different levels of *Aloe vera, Curcuma longa* (Turmeric), Probiotic and its combinations

Age (weeks)	T_1	T_2	T_3	T_4	T_5	T_6	T_7
21-24	84.64±2.59	91.07±1.31	88.00±0.36	91.18±1.05	90.07±1.31	83.64±2.59	86.71±2.21
25-28	89.86±1.14	92.07±1.54	92.56±0.52	92.25±0.69	93.07±1.54	90.86±1.14	88.79±1.40
29-32	92.29±0.60	94.96±0.43	92.07±0.95	93.64±0.43	93.96±0.43	91.29±0.60	87.90±3.08
33-36	94.14^{a}±0.60	93.25^{ab}±0.65	92.57^{bc}±0.86	91.46^{bc}±0.36	93.25^{ab}±0.65	94.14^{a}±0.60	90.46^{c}±0.96
37-40	92.25±0.26	93.14±0.17	92.75±0.88	90.28±1.25	93.14±0.17	93.25±0.26	90.18±0.96
41-44	93.14^{A}±0.17	93.07^{A}±0.26	92.18^{A}±0.55	90.21^{B}±0.34	93.07^{A}±0.26	93.14^{A}±0.17	89.89^{B}±0.17
45-48	92.57^{A}±0.30	92.96^{A}±0.43	92.07^{A}±0.40	90.11^{B}±0.27	92.96^{A}±0.43	92.57^{A}±0.30	89.57^{B}±0.17
49-52	91.46^{A}±0.36	91.67^{A}±0.69	90.46^{AB}±0.30	88.61^{B}±0.36	91.67^{A}±0.69	91.46^{A}±0.36	87.71^{B}±0.26
Overall (21-52)	92.29^{a}±1.46	92.52^{a}±0.34	91.70^{a}±0.42	90.97^{a}±0.87	92.52^{a}±0.34	92.29^{a}±1.46	88.90^{b}±0.70

Each value is a mean of three observations, $^{a-c}$Means within a row with no common superscript differ significantly ($p<0.05$)
$^{A-B}$Means within a row with no common superscript differ significantly ($p<0.01$)

Table 5: Mean (±S.E.) percent broken eggs of Single Comb White Leghorn layers fed diet with different levels of *Aloe vera, Curcuma longa* (Turmeric), Probiotic and its combinations

Age (weeks)	T_1	T_2	T_3	T_4	T_5	T_6	T_7
21-24	0.13±0.12	0.36±0.35	0.44±0.44	0.45±0.30	0.35±0.35	0.12±0.12	0.91±0.57
25-28	0.32±0.19	0.00±0.00	0.11±0.11	0.32±0.19	0.00±0.00	0.32±0.19	0.57±0.42
29-32	0.12±0.11	0.10±0.10	0.11±0.11	0.32±0.18	0.10±0.10	0.11±0.11	1.18±0.73
33-36	0.00±0.00	0.73±0.41	0.74±0.01	1.91±1.91	0.63±0.41	0.00±0.00	1.71±0.71
37-40	0.00±0.00	0.00±0.00	0.83±0.43	1.91±0.91	0.00±0.00	0.00±0.00	1.91±0.91
41-44	0.00±0.00	0.00±0.00	0.00±0.00	0.22±0.22	0.00±0.00	0.00±0.00	0.33±0.19
45-48	0.00±0.00	0.00±0.00	0.00±0.00	0.44±0.29	0.00±0.00	0.00±0.00	0.55±0.29
49-52	0.00±0.00	0.00±0.00	0.00±0.00	0.35±0.19	0.00±0.00	0.00±0.00	0.68±0.34
Overall (21-52)	0.06^{c}±0.06	0.15^{c}±0.06	0.28^{bc}±0.15	0.74^{ab}±0.32	0.15^{c}±0.06	0.06^{c}±0.06	0.98^{a}±0.20

Each value is a mean of three observations, $^{a-c}$Means within a row with no common superscript differ significantly ($p<0.05$)

Table 6: Mean (±S.E.) feed conversion ratio (kg/dozen eggs) of Single Comb White Leghorn layers fed diet with different levels of *Aloe vera, Curcuma longa* (Turmeric), Probiotic and its combinations

Age (weeks)	T_1	T_2	T_3	T_4	T_5	T_6	T_7
21-24	1.42±0.03	1.36±0.03	1.37±0.01	1.38±0.00	1.36±0.03	1.41±0.03	1.41±0.03
25-28	1.32±0.02	1.23±0.02	1.31±0.01	1.32±0.01	1.33±0.02	1.32±0.02	1.38±0.02
29-32	1.32±0.05	1.33±0.05	1.34±0.04	1.30±0.00	1.31±0.05	1.32±0.05	1.38±0.02
33-36	1.39±0.01	1.32±0.04	1.38±0.03	1.43±0.03	1.42±0.04	1.36±0.01	1.40±0.07
37-40	1.44±0.02	1.45±0.01	1.50±0.01	1.53±0.02	1.45±0.01	1.44±0.02	1.55±0.02
41-44	1.47±0.05	1.37±0.01	1.47±0.01	1.52±0.03	1.47±0.01	1.46±0.05	1.52±0.05
45-48	1.48^{a}±0.01	1.48^{a}±0.01	1.49^{ab}±0.00	1.53^{ab}±0.03	1.48^{a}±0.01	1.48^{a}±0.01	1.54^{b}±0.01
49-52	1.51^{a}±0.00	1.50^{a}±0.03	1.52^{ab}±0.01	1.57^{b}±0.02	1.50^{a}±0.03	1.51^{a}±0.00	1.58^{b}±0.01
Overall (21-52)	1.40±0.04	1.32±0.05	1.42±0.05	1.44±0.05	1.42±0.05	1.41±0.04	1.47±0.05

Each value is a mean of three observations, $^{a-b}$Means within a row with no common superscript differ significantly ($p<0.05$)

eggs was significantly ($p<0.05$) high in group fed with turmeric and its combination with probiotic compared to other treatment groups

Feed conversion ratio: The feed conversion ration per dozen eggs (Table 6) differ significantly after 45 weeks of age in all treatment groups. But there is no significant difference in overall mean feed conversion ratio during the experimental period. This was contrary to the findings of Kumari *et al.* (1994) and Namagirilakshmi (2005) who reported that supplementation of *aloe vera*, probiotic and turmeric in chicken diet showed better feed efficiency.

Return over feed cost: The return over feed cost (Table 7) differ significantly during (37-40 weeks) and

Table 7: Mean (±S.E.) return over feed cost (Rs./bird) of Single Comb White Leghorn layers fed diet with different levels of *Aloe vera*, *Curcuma longa* (Turmeric), Probiotic and its combinations

Age (weeks)	T_1	T_2	T_3	T_4	T_5	T_6	T_7
21-24	6.50±0.81	9.84±0.74	8.40±0.11	8.52±0.04	8.84±0.74	7.50±0.81	7.75±0.69
25-28	8.62±0.53	10.60±0.49	9.82±0.18	9.83±0.17	9.60±0.49	9.62±0.53	8.43±0.39
29-32	9.65±0.95	10.02±0.96	9.53±0.86	10.10±0.05	10.02±0.96	9.65±0.95	8.29±0.21
33-36	8.23±0.18	9.44±0.75	8.72±0.37	7.89±0.52	8.24±0.75	9.23±0.18	8.19±0.55
37-40	7.87^{A}±0.11	8.58^{A}±0.33	6.80^{AB}±0.21	5.99^{B}±0.34	7.58^{A}±0.33	7.87^{A}±0.11	5.88^{B}±0.43
41-44	7.48±0.03	7.32±0.13	7.23±0.23	6.32±0.68	7.32±0.13	7.48±0.03	6.31±0.79
45-48	7.11^{a}±0.13	8.20^{a}±0.25	6.99^{ab}±0.12	6.09^{bc}±0.58	7.20^{a}±0.25	7.11^{a}±0.13	5.91^{c}±0.13
49-52	6.63^{a}±0.11	8.81^{a}±0.50	6.25^{ab}±0.13	5.43^{b}±0.58	6.81^{a}±0.50	6.63^{a}±0.11	5.19^{b}±0.18
Overall (21-52)	63.09^{ab}±0.28	66.61^{a}±0.51	63.74^{b}±0.20	60.17^{c}±0.39	65.61^{a}±0.51	65.09^{ab}±0.28	55.95^{d}±0.54

Each value is a mean of three observations, $^{a-d}$Means within a row with no common superscript differ significantly ($p<0.05$), $^{A-B}$Means within a row with no common superscript differ significantly ($p<0.01$), Cost of *Aloe vera* = Rs. 250/kg; Turmeric = Rs. 50/kg and Probiotic = Rs. 120/kg, Cost of treatment feed (T_1-T_7) = Rs. 11.50/kg Price of an egg = Rs.2.30/egg

after 45 weeks of age. The return over feed cost was high in group fed with *aloe vera* but it did not differ significantly when compared to the control. This was similar to the findings of Kumar *et al.* (2005), Namagirilakshmi (2005) and Durrani *et al.* (2006).

ACKNOWLEDGEMENT

The authors are thankful to the Dean, Veterinary College and Research Institute, Namakkal for the facilities provided to carry out this research work.

REFERENCES

Al-Sultan, S.I., 2003. The effect of *Curcuma longa* (turmeric) on overall performance of broiler chickens. Int. J. Poult. Sci., 2: 351-353.

AOAC, 1995. Official Methods of Analysis. 16th Edn., Association of Official Analytical Chemists, Arlington, Virginia, USA.

B.I.S., 1992. Nutrient requirement for poultry. Bureau of Indian Standards, I.S., 13574.

Durrani, F.R., Mohammad Ismail, Asad Sultan, S.M. Suhail, Naila Chand and Z. Durrani, 2006. Effect of different levels of feed added turmeric (Curcuma longa) on the performance of broiler chicks. J. Agric. Biol. Sci., 1: 9-11.

Kumar, M., R.S. Choudhary and J.K. Vaishnav, 2005. Effect of supplemental prebiotic, probiotic and turmeric in diet on the performance of broiler chicks during summer. Indian J. Poult. Sci., 40: 137-141.

Kumari, P., M.K. Gupta, R. Rajan, K.K. Singh and R. Yadava, 1994. *Curcuma longa* as feed additive in broiler birds and its patho-physiological effects. Nat. Toxicol. Program. Technol. Rep. Ser., 435: 1-298.

Namagirilakshmi, S., 2005. Turmeric (*Curcuma longa*) as nutraceutical to improve broiler performance. M.V.Sc., thesis submitted to Tamil Nadu Veterinary and Animal Sciences University, Chennai-51.

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