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Effect of Neem Oil Supplementation on Growth Performance and Hematobiochemical Profile in Broilers

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Abstract

A study was undertaken on one hundred day old broiler chicks to obtain information about safe levels of neem oil supplementation in broiler feed for economic poultry farming. Significant decrease in body weight and feed consumption was observed in birds on addition of 0.4 per cent neem oil. Hematological study revealed non significant difference between treatment group and control group birds. Birds given 0.4 % neem oil showed numerical increased TLC, absolute heterophil and absolute lymphocyte count when compared with control and other treatment group birds (0.1, 0.2 and 0.3 % neem oil). Average plasma glucose level showed dose dependent hypoglycemic response. Serum total protein and serum globulin level showed significant decrease at 0.4 per cent level suggesting adverse effect in broilers. It is thus concluded that neem oil supplementation up to 0.3 per cent in feed could be used safely in broilers.

Introduction

Commercial poultry production has gained popularity since last two dacades. In modern poultry farming there is a major demand to produce high quality poultry meat and egg at low price without rely on antibiotics and other medicinal use in poultry feed and water (Jawad *et al.*, 2014). Recently the use of antibiotic growth promoter in poultry industry has been seriously criticized by government policy makers and consumers because of the development of microbial resistance to the poultry products and the potential harmful effects on human health (Mahejabin *et al.*, 2015). Herbal agents could serve as safer alternatives as growth promoters due to their suitability, lower cost of production, reduced toxicity risks and minimum health hazards. The neem tree (*Azadirachta indica*) is known for its useful medicinal properties like antibactrial, antiviral, antifungal, antiprotozoal, hepatoprotective, immunomodulator and various other properties without showing any adverse affects (Kale *et al.*, 2003). Hence the present study was planned to exploit possible beneficial/ adverse effect of neem oil in economic poultry farming.

Materials and Methods

During present investigation, one hundred day old broiler chicks (Vencob) were randomly selected and allowed to acclimatize for 7 days and were supplied with normal commercial feed and water. After acclimatization chicks were divided into five equal groups of 20 broilers in each. Group T1 served as a healthy control and group T2, T3, T4 and T5 were given neem oil @ 0.1, 0.2, 0.3 and

0.4 per cent respectively in commercial ration. Chicks were fed *ad-lib* with their respective diets and provided fresh drinking water for consecutive period of six weeks and were kept under close observation. Average body weight and feed consumption at sixth week were recorded for each group. At the end of sixth week, from randomly selected six birds blood samples were collected from wing vein in vacutainer containing sodium fluoride (1 %) as anticoagulant for biochemical estimations and in double oxalate bulb for hematological estimations. Hematological parameters were estimated as per the standard method. For biochemical parameters serum was separated and stored at -20° C until further use. Estimation of biochemical parameters viz. Glucose, Calcium, Phosphorus, Total proteins, Albumin and Globulin were carried out on Automated analyzer by using Auto Span reagents procured from "Span Diagnostics Ltd.", Surat, Gujrat.

Result and Discussion:

During experimental period of six week, treatment as well as control group birds did not show any clinical manifestations. However few birds from T5 group showed ruffled feathers. No mortality was recorded in any of the group. On sixth week average body weight was found to be 1494.45 g, 1471.67 g, 1385.61 g, 1458.61 g and 1329.45 g in T1, T2, T3, T4 and T5 group, respectively . There was significant decrease ($P<0.05$) in body weight in T5 group birds compared to control and other treatment group birds. The average feed consumption up to sixth week differ significantly among different groups and was recorded as 510.82 g, 475.88 g, 462.54 g, 464.64 g and 448.86 g in T1, T2, T3, T4 and T5 group birds, respectively indicating dose dependant decrease in feed consumption. The significant decrease in body weight and feed consumption at 0.4 per cent could be possibly due to effect of possible toxic component in neem oil which decreases palatability due to its bitter principle. The present findings also corroborates with Deore (2002).

The results presented in table 1 and 2 revealed that there was no statistical significant changes in hematological and biochemical parameters, however there was gradual decrease in some hematological parameters viz. Hb, PCV, TEC, MCV, MCH, and MCHC as the dose rate of neem oil increases. The decrease in above parameters was found to be highest in group T5 birds. At the same time some hematological parameters viz. absolute heterophil, absolute lymphocyte, absolute eosinophil and absolute basophil and TLC were found to increase non significantly. This elevating trend in heterophil and lymphocyte count fed 0.4 per cent neem oil in feed suggests stimulatory effect on leucopiosis. Our observation corroborates with Wanker *et al.* (2009) and Alam

Table: 1 Average hematological value in broilers fed with different levels of neem oil.

Sr. No.	Parameters studied	Treatment Groups				
		T1 (Control)	T2 (0.1 % neem oil)	T3 (0.2 % neem oil)	T4 (0.3 % neem oil)	T5 (0.4 % neem oil)
1	Hb (g/100 ml)	10.73±0.68	10.20±0.52	9.76±0.67	9.90±0.50	8.86±0.51
2	PCV (%)	29.50±1.94	27.83±2.04	27.33±1.05	28.16±1.27	25.50±0.95
3	TEC (10^6/cumm)	2.87±12.30	2.82±7.61	2.64±9.45	2.77±8.57	2.57±8.74
4	TLC (10^3/cumm)	20.50±1.14	20.66±1.11	21.66±1.20	21.83±1.42	23.66±1.20
5	MCV (cuμ)	102.14±3.80	98.17±5.52	103.39±1.45	102.31±6.40	99.22±2.81
6	MCH (μμg)	37.14±0.92	36.06±1.28	37.11±2.70	35.66±1.01	34.34±0.95
7	MCHC (%)	36.56±1.35	37.08±1.61	35.94±2.90	35.53±2.62	34.74±1.29
8	Absolute Heterophil	7595.00±466.43	7790.00±613.87	8150.00±731.24	8335.00±763.64	9466.00±813.21
9	Absolute Lymphocyte	11496.66±1053.25	10953.00±563.71	11490.00±804.21	11426.66±804.21	12096.66±186.57
10	Absolute Monocyte	1010.00±90.29	1113.33±185.52	1180.00±154.74	1250.00±177.52	1166.00±178.71
11	Absolute Eosinophil	533.33±47.23	616.66±125.47	693.33±141.01	698.00±115.48	763.33±135.88
12	Absolute Basophil	131.66±42.61	166.66±34.51	143.33±46.59	123.33±87.08	173.33±110.00

Table: 2 Average biochemical value in broilers fed with different levels of neem oil

Sr. No.	Parameters studied	Treatment Groups					Critical Difference
		T1 (Control)	T2 (0.1 % neem oil)	T3 (0.2 % neem oil)	T4 (0.3 % neem oil)	T5 (0.4 % neem oil)	
1	Glucose (mg/dl)	283.46±5.89	276.20±5.60	256.78±10.11	258.08±10.98	251.51±13.91	-
2	Calcium (mg/dl)	5.52±0.64	5.28±0.48	5.13±0.33	5.45±0.26	5.16±0.41	-
3	Phosphorus (mg/dl)	4.10±0.36	3.87±0.23	3.88±0.41	3.98±0.22	3.81±0.30	-
4	Total protein (g/dl)	4.93^{b} ±0.46	4.85^{b} ±0.19	4.68^{b} ±0.20	4.26^{ab} ±0.22	3.80^{a}±017	0.81 (P<0.05)
5	Albumin (g/dl)	1.81±0.15	1.96±0.10	1.78±0.12	1.88±0.22	1.68±0.12	-
6	Globulin (g/dl)	3.13^{c} ±0.36	2.88^{bc} ±0.24	2.90^{bc} ±0.11	2.38^{ab} ±0.15	2.11^{a}±0.15	0.67 (P<0.05)

et al. (2015) in neem powder supplementation in chicken feed. The non significant changes in hematological estimates suggested limited adverse effect of neem oil supplementation in chicken feed. Similarly, there was dose dependent decrease in glucose, calcium, phosphorus, total protein, albumin and globulin. The decrease in glucose, calcium and phosphorus was statistically non significant however decrease in total protein and globulin was significant (P<0.05) at 0.4 per cent level of neem oil. Hypoglycemic effect of neem oil supplementation is also reported by Gowda et al. (2000). Significant decrease in total protein may be due to lower feed intake. Similar finding of serum protein were also recorded by Badri *et al.* (1993) and Hore *et al.* (1999). From the observations it is thus concluded that neem oil supplementation up to 0.3 per cent in feed could be used safely in broilers.

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Conflict of Interest: All authors declare no conflict of interest.

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