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Effect of feeding black pepper, dry Tulsi leaves and black cumin seeds on growth performance of broiler chicks

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Abstract
This study evaluated phytogenic growth promoters for broiler chickens. A total of 180 broiler chicks were distributed into four treatment groups 45 chicks: Control group T_1, without any supplementation, T_2 group was supplemented with Black cumin seed @ 300 g/ton of feed. T_3 and T_4 groups were added Black pepper and dry Tulsi leaves @ 300 g/ton of feed, respectively. The trial was conducted with three replicates of 15 in each group. The average body weight was found to be significant in all the six weeks. Weight gain was found to be highly significant in week I, II, III, IV and VI. The average feed consumption was found to be significant in all the weeks. The effect of Black cumin seed, Black pepper and dry Tulsi leaves on feed conversion efficiency were highly significant ($P \leq 0.01$) at the starter (week I-III) at finisher stage (week IV-VI) and on cumulative feed conversion ratio (I-VI weeks).

Keywords: Broiler, black cumin, black pepper, Tulsi

Introduction
Feed additives have been used from very long to enhance animal's production and to improve feed efficiency. With the ban on the use of antibiotics as feed additives has led to investigations of non conventional feed additives in animal production. The search is therefore on for an economically viable alternative to the antibiotic growth promoters. Under the intensive management systems, herbal extracts are being used as feed supplements to improve growth performance. The phytogenic growth promoters are a more recent addition in this list which is commonly defined as plant derived compounds added into diets to improve the productivity of livestock through improving nutrient digestibility and improving the quality of food derived from those animals. Phytogenic growth promoters are devoid of any undesirable effects and are totally safe for consumers. In this line Black cumin seeds, Black pepper and Tulsi leaves are being used by many researcher as growth promoters. Black cumin seed contains essential fatty acid linoleic acid which is important for obtaining maximum body weight (Saleh-al-jassir, 1992) [8]. Antibacterial activity of *N. sativa* seed extracts has also been reported (Nair *et al*., 2005) [7]. Black pepper is a known spice which improves digestibility. Dietary piperine, by favorably stimulating the digestive enzymes of pancreas, enhances the digestive capacity and significantly reduces the gastrointestinal food transit time. Tulsi (*Ocimum sanctum*) is a plant widely used in Ayurveda, has been shown to possess antiinflammatory, antioxidant and cognition enhancing properties (Yanpallewar *et al*., 2004) [11]. Tulsi leaves also contain ascorbic acid and carotene as well. Aqueous extract feeding also provided significant liver and aortic tissue protection (Geetha *et al*., 2004) [4]. The objective of this study was to evaluate the effect of feeding Black cumin seeds, Black pepper and Tulsi leaves on performance of broilers.

Materials and Methods
The present study was conducted at the Poultry Farm, College of Veterinary and Animal Science, Bikaner. The study was conducted for a period of 6 weeks to study the effect of supplemented phytogenic growth promoter viz. black cumin seeds (*Nigella sativa*), Tulsi (*Ocimum sanctum*) leaves and Black pepper (*Piper nigrum*) in diets on broiler performance on the performance of broilers. Experimental diet showed in Table 1.

Table 1: Number of broiler chicks assigned randomly to various experimental groups

Treatments		Replicates			Total chicks
		I	II	III	
T_1	Basal diet(control)	15	15	15	45
T_2	Basal diet + Black pepper powder @300gm/ton	15	15	15	45
T_3	Basal diet + Tulsi dry leaf powder@300gm/ton	15	15	15	45

Each replicate of 15 chicks were reared in separate, clean and disinfected floor pens allotted randomly. Fresh and dry wheat straw was used as litter. In each pen one 250 watt infra red bulb was placed 1 and ½ feet above the level of litter for brooding purpose. The temperature for brooding was controlled by increasing or decreasing the height of bulb. A photo period of 24 hours duration was provided throughout the experimental period for all eight of study groups. All the chicks were reared under almost identical standard managemental practices like brooding, lighting, watering and health care during the entire course.

Adequate and identical floor, feeding and watering space were provided to chicks of all the four groups throughout the experiment. Earthen vessels were used to provide water. The detailed composition of the broiler ration (both Starter and Finisher) used for feeding the chicks is presented in Table 2.

Table 2: Composition of basal ration fed to chicks

Ingredient	Starter Ration (Parts per 100)	Finisher Ration (Parts per 100)
Maize	40	52
Wheat bran	10	8
Rice polish	8	6
Ground nut cake	30	26
Fish meal	10	6
Mineral mixture	2	2
Total	100	100
Calculated Composition (%) CP Energy (Kcal/kg)	23.1046 2905.56	20.1532 3120.02

Body weight (g) the chicks was recorded on the third day of their procurement and thereafter regularly at weekly interval up to six weeks of age. The weekly live weight gain was calculated from the difference in body weight attained at the end and at the start of the period in question. Feed consumption of each pen was recorded weekly and average feed intake in gram/chick/week was calculated by dividing the total amount of feed by the number of chicks in the particular pen. Cumulative feed consumption for experimental period was also recorded. Feed conversion ratio was calculated by dividing the cumulative feed intake by body weight gain of chicks for the particular period of time. The feed conversion ratio was calculated upto starter and finisher phase. Returns over feed cost and cost of feed additives under different feeding groups were taken into account.

Results and Discussion

The analysis of variance revealed a highly significant effect ($P \leq 0.01$) of treatment i.e. black cumin seeds (*Nigella sativa*), Tulsi (*Ocimum sanctum*) leaves and Black pepper (*Piper nigrum*) the average weekly body weight of broiler chicks, at I, II, III, IV, V and VI weeks (Table 3). These were in line with Erener *et al.* (2010) [3], Al-Kassie *et al.* (2011) [1] and Sanjyal and Sapkota (2011) [9] who reported improvement in body weight with addition of Black cumin seeds, Black pepper and Tulsi leaves in broiler diets respectively.

Table 3: Means with respective standard errors for body weight (g) at different weeks

Treatment	Age in weeks					
	I**	II**	III**	IV**	V**	VI**
T_1	111.77^{a} ±1.88	197.61^{a} ±4.77	313.97^{a} ±8.37	472.61^{a} ±8.73	690.7^{a} ±11.63	1023.68^{a} ±20.81
T_2	115^{ab} ±2.38	245.29^{b} ±8.37	373.79^{b} ±6.67	572.92^{b} ±9.03	853.26^{b} ±15.68	1205.12^{b} ±16.26
T_3	125.15^{c} ±2.15	262.2^{b} ±6.57	398.31^{c} ±4.56	598.30^{b} ±9.83	890.80^{b} ±17.99	1237.95^{b} ±17.42
T_4	121.22^{bc} ±2.17	255.95^{b} ±8.02	385.22^{bc} ±7.07	590.04^{b} ±13.13	884.26^{b} ±19.18	1238.07^{b} ±18.25

Mean values in each column having same superscript do not differ significantly ($p<0.05$)

The effect of Black cumin seeds (*Nigella sativa*), Tulsi (*Ocimum sanctum*) leaves and Black pepper (*Piper nigrum*) on cumulative weight gain (week I-VI) was found to be highly significant ($P<.01$) (Table 4). This might be possible due to digestibility properties of Black pepper and Black cumin. Tulsi have antioxidant properties that can influence weight gain of broilers. Sanjyal and Sapkota (2011) [9] reported that Tulsi leaves gave better output than the diet supplied with antibiotics and probiotics. Al-Kassie *et al.* (2011) [1] showed that using black pepper in their diet had significant effects on performance.

Table 4: Means with respective standard errors for body weight gain (g) at different weeks

Treatment	Age in weeks						
	I	II	III	IV	V	VI	I-VI
T_1	57.15^a ±1.93	85.65^a ±4.94	115.58^a ±10.33	158.07^a ±8.33	217^a ±9.93	331.21^a ±21.15	969.00^a ±20.68
T_2	59.51^a ±2.36	130.45^b ±8.67	127.44^{ab} ±7.31	200.47^b ±8.52	280.75^b ±11.14	351.85^a ± 16.63	1149.73^b ±16.09
T_3	70.26^b ±2.27	137.04^b ±6.98	134.81^b ±5.48	199.59^b ±9.34	292.5^b ±15.27	343.41^a ±18.04	1182.82^b ±17.54
T_4	67.68^b ±2.21	134.73^b ±8.25	126.97^{ab} ±7.46	204.93^b ±10.6	295.40^b ±11.78	352.22^a ±12.57	1184.35^b ±13.47

Mean values in each column having same superscript do not differ significantly (p<0.05)

The analysis of variance for feed consumption revealed that the effect of black cumin seeds (*Nigella sativa*), Tulsi (*Ocimum sanctum*) leaves and Black pepper (*Piper nigrum*) on feed consumption at some weeks was found to be non significant (Table 5), but cumulative feed intake (I-VI weeks) was found to be significant (P<0.05). The increased feed intake can be due to increased appetite by stimulation of digestive system with supplementation of black cumin seed and black pepper (Erener *et al*. 2010) [3] and (Mansoub *et al.* 2011) [6]. Swathi *et al.* (2012) [10] has reported improved feed intake in summer months with supplementation of Tulsi leaves.

Table 5: Means with respective standard errors for feed consumption (g) at different weeks

Treatment	Age in weeks						
	I	II	III	IV	V	VI	I-VI
T_1	131.83^a ±0.85	189.33^b ±11.98	274.23^a ±90.14	387.64^a ±47.98	481.21^a ±25.57	742.10^a ±64.02	2206.36^a ±37.06
T_2	135.48^b ± 6.99	255.98^b ±19.54	293.01^a ± 38.33	392.54^a ±26.92	588^a ±8.51	858.74^b ±10.03	4424.26^b ±31.91
T_3	192.65^b ±0.90	454.35^b +4.26	982.78^c ±13.18	1174.78^b ±16.26	957.02^{bc} ±15.78	851.55^b ±2.94	4613.15^b ±16.17
T_4	195.75^b ±5.29	447.95^{ab} ±9.44	903.35^b ±11.62	1142.60^b ±5.96	863.35^a ±29.38	842.00^b ±5.46	4395.03^b ±56.95

Mean values in each column having same superscript do not differ significantly (p<0.05)

The effect of black cumin seeds (*Nigella sativa*), Tulsi (*Ocimum sanctum*) leaves and Black pepper (*Piper nigrum*) on feed conversion ratio was found to be highly significant (P ≤ 0.01) at the starter phase (I-III weeks), finisher stage (week IV-VI) and overall (I-VI weeks). The benefit can be attributed to better utilization of nutrients through better assimilation and absorption improving gut environment. These results of best/lowest and highest FCR can be clearly correlated from Table 6, wherein overall weight gain was highest in T_4 group and lowest in control group T_1. Better feed conversion ratio may be attributed to the antibacterial, antioxidant and immunomodulatory properties of these supplements, which resulted in better absorption of the nutrients present in the gut and finely leading to improvement in feed conversion ratio of the rations. The results are in accordance with Ashayerizadeh *et al.* (2009) [2], Mansoub *et al.* (2011) [6], Al-Kassie *et al.* (2011) [1], Lanjewar *et al.* (2008) [5] and Swathi *et al.* (2012) [10] who reported improvement in feed conversion ratio on supplementation of Black cumin seeds Black pepper and Tulsi leaves in broiler diet respectively.

Table 6: Mean feed conversion ratio with respective standard errors at I - III, IV-VI and I-VI weeks

Treatment	Age in weeks		
	I-III	IV-VI	I-VI
T_1	2.30 ± 0.025^b	2.28± 0.02^c	2.29± 0.03^c
T_2	2.15± 0.03^a	2.08± 0.05^b	2.10± 0.04^b
T_3	2.09± 0.01^{ab}	2.01± 0.04^{ab}	2.03± 0.02^{ab}
T_4	2.05± 0.06^a	1.94± 0.01^a	1.97± 0.01^a

Means in a column with no common superscript differ significantly.

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