EFFECT OF *OCCIMUM SANCTUM* (TULSI) LEAF AND *ZINZIBER OFFICINALE* (GINGER) POWDER AS FEED ADDITIVES ON GROWTH PERFORMANCE OF BROILER CHICKS[#]

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ABSTRACT

The objective of the study was to evaluate the effect of *Occimum sanctum* (Tulsi) and *Zinziber officinale* (Ginger) as feed additives on growth performance of broiler chicks. Two hundred and ten- day-old chicks were purchased from local market and divided into seven treatment groups, with three replicates having 10 chicks each in a completely randomized design for 42 days. Control group was fed on basal diet and T1 & T2 treatment group were supplemented with 0.5 % and 1 % of tulsi leaf powder in the experimental broiler starter and finisher ration, respectively. Likewise, G1 & G2 treatment group were supplemented with 0.5% & 1% of ginger powder in the experimental broiler starter and finisher ration, respectively. T1G1 and T2G2 treatment groups were supplemented with 0.5 % and 1 % of both herbs i.e. tulsi plus ginger powder in combination, respectively. The statistical analysis of data revealed significant (P<0.01) effect of tulsi and ginger supplementation alone and in combination on feed intake and feed conversion ratio. Feed intake, feed conversion ratio was significantly (P<0.01) lower in G1, T2G2 group, respectively and higher for control group. Body weight, body weight gain, daily body weight gain, performance index, protein efficiency ratio was significantly (P<0.01) higher in tulsi and ginger supplemented alone or in combination group as compare to control group and highest for T2G2 group. It could be concluded that supplementation of *Occimum sanctum* (Tulsi) leaf and *Zinziber officinale* (Ginger) powder as feed additives alone or in combination at 0.5 % & 1 % of both herbs improved growth performance of broiler chicks.

***Key words*:** Tulsi, ginger, broiler, FCR, performance index

Introduction

Feed additives are commonly described as non-nutrient substances which accelerate growth, feed conversion ratio, beneficial for health or metabolic rate of the animals (Church and Pond, 1988). The wide range of feed additives used in animal production industry ranging from growth promoters to disease preventing agents. Supplementation of such type of feed additives with feed is mainly aimed to improve digestibility and bioavailability of various nutrients, thereby, raising economic gains by decreasing the input costs. Herbs could be expected to serve as feed additives due to their suitability and preference, reduced risk of harmfulness and minimum health hazards (Devegowda, 1996). Moreover, there is great phobia in using antibiotic as feed additives because public is more aware about antibiotic residues in animal product and the potency of evolving antibiotic resistant bacteria. So consumer nowadays is becoming more aware of safety and excellence of food products consumed by them. The production of safer poultry products without any microbic and chemic residues in an economic manner is the need of the day.

Tulsi (*Ocimum sanctum*) is known as queen of herbs, is one of the holiest and most cherished herbs in India. The plant is reported to possess antibacterial, anticancer (Joshi *et al.,*2009), antidiabetic, antifungal, antimicrobial, antihepatotoxicity, cardioprotective, antiemetic agent, antioxidative (Subramanian *et al.,* 2005), anticonvulsant, analgetic, anti-ulcerogenic and ulcerating properties and nontoxic (Singh *et al.,* 2012). Eugenol, ascorbic acid, ß-carotene, ß-sitosterol, palmitic acid and tannins are the main constituents responsible for these properties (Gupta *et al*., 2006; Choudhury *et al.,* 2010).

Zingiber officinale is a perennial plant commonly known as ginger and belongs to the family *Zingiberaceae*. In many of the countries it is widely used as a food condiment or spice and as a medicinal herb to prevent disease or promote the growth (Chrubasik *et al.,* 2005). The main important compounds in ginger are gingerol, gingerdiol and gingerdione which have the ability to stimulate or quicken enzymes of digestive system, stimulate the microbial activity and having antioxidative activity (Dieumou *et al.,* 2009). In addition to its microbial activity it has been shown that ginger stimulates the high production of aldosterone in male rats which is an anabolic harmone (Shalaby and Hamowieh, 2010). Thus ginger may have enhancing ability on growth as well as early sexual maturity. *Zingiber officinale* was found to be an alternative growth promoter for antibiotics (Demir *et al.,* 2003). In addition, ginger was reported to increase growth, decrease mortality percentage and improve feed utilization (Issa and Omar, 2012; Oleforuh-Okoleh *et al.,* 2014).

The main objective of this study is to gain more information about effect of Tulsi (*Ocimum sanctum*) and Ginger (*Zingiber officinale*) on growth performance.

Materials and Methods

The experiment was carried out on two hundred and ten-day-old chicks which were purchased from local market and divided into seven treatment groups, with three replicates having 10 chicks each in a completely randomized design for 42 day. Routine vaccination against Ranikhet disease (F1

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Table 1: Proximate composition of broiler starter and finisher ration

S. No.	Proximate Principle	Broiler starter	Broiler Finisher
1.	Dry Matter (%)	91.33	92.30
2.	Crude Protein (%)	23.08	20.12
3.	Ether Extract (%)	04.40	04.86
4.	Crude Fibre (%)	05.55	05.25
5.	Total Ash (%)	07.51	06.61
6.	Nitrogen Free Extract (%)	59.46	63.16

strain) and Infectious Bursal Disease were carried out on 7th and 14th day of procurement of chicks. Commercially available readymade broiler starter and broiler finisher rations were procured and feed additives such as *Ocimum sanctum* (Tulsi) and *Zingiber officinale* (Ginger) were supplemented. The experimental feed will be analyzed for proximate constituents by procedures of AOAC (2016) and presented in Table 1. Control group was fed on basal diet and T1 and T2 treatment group were supplemented with 0.5% and 1% of Tulsi leaf herb in the experimental broiler starter and finisher ration, respectively. Likewise, G1 and G2 treatment group were supplemented with 0.5% and 1% of Ginger herb in the experimental broiler starter and finisher ration, respectively. T1G1 and T2G2 treatment groups were supplemented with 0.5% and 1% of both herbs in combination, respectively. Weekly body weight, feed consumption, body weight gain, daily body weight gain, feed conversion ratio, performance index, protein efficiency ratio of birds were recorded. Statistical analysis was performed according to the method described by Snedecor and Cochran (1994) and results will be interpreted.

Results and Discussion

The results of overall growth performance of six week old broiler chicks are presented in Table 2. The statistical analysis of data revealed highly significant (P<0.01) effect of incorporation of herbs on overall growth performance of broiler. Results showed significant effect on feed consumption (P<0.01) with dietary supplementation of tulsi, ginger alone and their combination at different levels as feed additive in the ration of broilers. The present results concerning the feed intake are agreed with Singh *et al.* (2014) who reported significant reduction of feed intake with supplementation of *Ocimum sanctum* in broiler diet. Similarly Shinde *et al.* (2017) who observed decrease feed intake in ginger supplemented group as compared to control. The average body weight and body wight gain (g/bird) of broiler fed tulsi and ginger alone and in combination showed significantly higher body weight as compare to control group. Results of the present study are in agreement with Lanjewar *et al.* (2008), Swati *et al.* (2012), Singh *et al.* (2014) who reported that live body weight of broiler chicks increased significantly (P<0.01) with the supplementation of tulsi. Similarly results of the present study are in accordance with Prajapat (2016), Kumar (2016), Tanwar (2018), Yadav (2018) who reported significant increase in body weight and weight gain with supplementation of herbal powder alone or in combination with other herbs in broiler diet.

Table 2: Effect of supplementation of tulsi and ginger alone and in combination on growth performance of broiler chicks

Parameters	Treatments							CD
	C	T1	T2	G1	G2	T1G1	T2G2	
Final body weight (g)	2033.40^{e} ±11.84	2225.87^{c} ±9.31	2137.53^{d} ±8.95	2161.53^{d} ±21.40	2297.27^{b} ±25.43	2220.27^{c} ±2.34	2419.67^{a} ±6.06	60.67**
Weight gain (g)	1984.93^{e} ±11.94	2177.80^{c} ±9.11	2089.43^{d} ±8.92	2113.30^{d} ±21.52	2248.90^{b} ±25.47	2172.17^{c} ±2.30	2371.74^{a} ±5.72	60.70**
Daily weight gain (g)	283.56^{e} ±1.71	311.11^{c} ±1.30	298.49^{d} ±1.27	301.90^{d} ±3.07	321.27^{b} ±3.64	310.31^{c} ±0.33	338.82^{a} ±0.82	8.67**
Feed consumption (g)	3919.67^{a} ±10.73	3834.67^{b} ±29.20	3824.67^{b} ±11.85	3611.67^{d} ±8.99	3722.33^{c} ±30.91	3695.67^{c} ±19.74	3747.00^{c} ±16.80	84.46**
Feed conversion ratio	1.97^{a} ±0.06	1.76^{c} ±0.06	1.83^{b} ±0.04	1.71^{cd} ±0.06	1.65^{e} ±0.07	1.70^{de} ±0.05	1.58^{f} ±0.03	0.07**
Performance Index	1005.31^{e} ±14.12	1237.08^{c} ±16.78	1141.51^{d} ±9.24	1236.93^{c} ±27.80	1359.52^{b} ±37.88	1276.82^{c} ±9.43	1501.26^{a} ±4.95	85.51**
Protein Efficiency ratio	2.35^{e} ±0.06	2.63^{c} ±0.07	2.52^{d} ±0.05	2.71^{bc} ±0.08	2.79^{b} ±0.10	2.72^{b} ±0.06	2.92^{a} ±0.04	0.16**

Note: The means bearing different superscript (a, b, c, d and e) in the row differ significantly ** (P <0.01)

The average daily body weight gain was significantly higher in treatment groups as compare to control group. Significant increase in daily body weight gain confirms the findings of Olefaruh-Okoleh (2014), Sa'aci *et al.* (2018), Andriyanto *et al.* (2016), Onu (2010). Results revealed highly significant effect on feed conversion ratio (P<0.01) with dietary supplementation of tulsi, ginger alone and their combination at different levels as feed additive in the ration of broilers. This indicated that inclusion of tulsi, ginger alone and their combination has positive influence on average feed conversion ratio. The result obtained in present study fall in line with the findings of Lanjewar *et al*. (2008), Swathi *et al.* (2012), recorded improvement in FCR with inclusion of Tulsi as feed additive in the diet of broilers. Similarly Shinde *et al.* (2017), Eltazi (2014), Mohamed *et al.* (2012) reported significant improvement of FCR in broiler fed different levels of ginger powder as compared to control group. Kumar (2016) reported feed conversion ratio improved significantly in dietary treatments with

supplementation of mixture of herbs.

Highly significant difference was observed in average PI and PER which was higher in T2G2 group supplemented with combination of 0.5% Tulsi and 0.5% ginger and lowest PI and PER was observed in control group which was supplemented with basal diet. The results of the present study corroborate with the findings of Prajapat (2016), Tanwar (2018) reported highly significant effect on performance index and protein efficiency ratio with supplementation of tulsi alone or in combination with other herbs. Mangal (2016) observed significant effect on protein efficiency ratio with ginger rhizome powder supplementation.

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