SHORT COMMUNICATION

Effect of Dietary Supplementation of Tulsi (*Ocimum sanctum*) Leaf and Ginger (*Zingiberofficinale*) Powder as Feed Additives on Broiler Performance

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Abstract

The study was conducted to evaluate the effect of tulsi leaf and ginger powder as feed additives on broiler performance. A total of 210, day-old chicks were divided into 7 groups in a completely randomized design, with 30 chicks in each group and reared for 42 days. Control group was provided with basal feed. T_1 and T_2 groups were supplemented with 0.5 and 1% of tulsi leaf powder, while G_1 and G_2 groups were supplemented with 0.5 and 1% of ginger powder in the ration, respectively. T_1G_1 group was supplemented with tulsi leaf and ginger powder each @ 0.25% of ration and T_2G_2 group was supplemented with tulsi leaf and ginger powder each @ 0.5% of ration. During starter and finisher period of trial, in T_2G_2 group, *i.e.,* broilers fed with tulsi leaf and ginger powder at 0.5% each had significantly higher ($p < 0.01$) body weight gain and improved ($p < 0.01$) feed conversion ratio as compared to control and rest of the groups. Significantly lowest feed intake ($p < 0.01$) during the starter period was observed in T_2G_2 group, and in G_1 group during the finisher period of trial. It could be concluded that tulsi leaf and ginger powder @ 0.5% each can be supplemented to improve growth performance and FCR of broilers.

Keywords: Broilers Growth performance, FCR, Feed additives, Ginger, Tulsi.

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Introduction

Antibiotics are used in poultry production since past 50 years to optimize growth performance but its ban in Europe, prompted scientists to think about alternatives to antibiotics (Diarra and Malouin, 2014). Various phytogenic feed additives (PFA) derived from plants, herbs and spices are used to improve animal performance. They have been very successful because of their positive effects on growth, improved immune system and reduced stress response on account of presence of variety of active ingredients. Tulsi (*Ocimum sanctum*) is a well-known therapeutic agent for several pathological conditions that has antistress and antioxidant properties. An alcoholic extract of Tulsi modulates immunity, thus promotes the immune system (Mondal *et al.,* 2011). Tulsi extract also have antimicrobial (Mittal *et al.,* 2018), antifungal (Khan *et al.,* 2010), antidiabetic (Hannan *et al.,* 2006), antithyroid (Panda and Kar, 1998), and antifertility, antinociceptive and anthelmintic (Khanna and Bhatia, 2003) properties. Ginger (*Zingiber officinale*) is a well-known plant widely used as a spice and medical treatment for certain ailments in traditional medicine (Zhang *et al*., 2009). Ginger contains several active compounds including gingerol, shogaols, gingerdiol, endoborneol, and gingerdione which have various biological activities such as antitumor, antioxidant, antiviral, antimicrobial and antifungal effects (Lopez *et al.,* 2017; Camero *et al.,* 2019). Therefore looking into the above facts, the present study was undertaken to evaluate the effect of dietary supplementation of tulsi leaf and ginger powder as feed additives on broiler performance.

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Materials and Methods

Experimental Birds and Procedures

The current study was conducted at the poultry farm of the College, Navania, Udaipur, India. 210 day-old, unsexed, healthy broiler chicks (Cob-400) procured from commercial hatchery were divided into 7 groups, 30 chicks in each group

with three replicates having 10 chicks each. A feeding trial of 42 days was conducted under deep litter system from April to May 2018. Routine vaccination against Ranikhet disease (F1 strain) and Infectious Bursal Disease were conducted. Commercially available readymade broiler starter and broiler finisher rations were procured from local market. Excellent quality of tulsi leaves and ginger roots were procured from Udaipur in sufficient quantity and were sun dried and ground to pass through 1 mm sieve and stored in airtight container for further analysis of proximate principles and minerals.

Broiler starter and finisher rations without and with feed additives were provided to broiler chicks from day 1–21 and day 22–42, respectively. Control group was provided with basal feed without tulsi leaf and ginger powder, while T_1 and T_2 groups were supplemented with 0.5 and 1% tulsi leaf powder and G_1 and G_2 groups were supplemented with 0.5 and 1% of ginger powder in the ration, respectively. T_1G_1 group was supplemented with tulsi leaf and ginger powder each @ 0.25% of ration and T_2G_2 group was supplemented with tulsi leaf and ginger powder each @ 0.5% of ration. During the study, identical standard management practices concerning brooding, feeding, watering and control of diseases *etc.* were followed for each group.

Body Weight Gain (g), Feed Consumption (g) and Feed Conversion Ratio were calculated following the standard procedure in routine.

Statistical Analysis

Data collected was subjected to statistical analysis for analysis of variance by statistical package for social science (SPSS, 2018), version 20. Significance of mean differences was calculated by Duncan's multiple range test at $P < 0.05$.

Results and Discussion

As per proximate analysis, tulsi leaf powder contained higher ether extract (6.96 vs1.40), crude fibre (16.90 vs 3.25) and total ash (9.55 vs 2.45), while ginger powder had higher NFE (87.00 vs 60.30) and phosphorus (0.95 vs 0.45), organic matter (97.55 vs 90.45) and the other fractions DM, CP and Ca were same in powder of both the herbs. The results of growth performance during starter and finisher period of the feeding trial are presented in Table 1. A highly significant ($p < 0.01$) effect of incorporation of herbs on growth performance of broiler was observed during the starter and finisher period. During both starter and finisher periods the highest ($p < 0.01$) average body weight gain and lowest feed conversion ratio in T_2G_2 group supplemented with tulsi leaf and ginger powder @ 0.5% each in basal diet were observed, which were comparable to the G_2 group, and the lowest ($p < 0.01$) average body weight gain and highest feed conversion ratio was recorded in the control group. During starter period highest feed intake was observed in control group, which was comparable with T_1 and T_2 group. The lowest average feed intake was observed in T_2G_2 group comparable with G_2 group and T_1G_1 group. During finisher period of trial, the lowest feed intake was revealed in G_1 group and the highest in the control group. The findings of this study revealed that birds fed tulsi leaf and ginger powder performed better in terms of growth performance than control group birds. Tulsi leaf and ginger with antioxidant activity leads to increased digestive enzymes and decreased bacterial activity, leading to better growth performance in broilers (Mittal *et al.,* 2018; Camero *et al.,* 2019). Reddy *et al.* (2012) recorded significantly ($p < 0.05$) higher body weight gain on supplementation of herbal mixture (Amla, Turmeric and Tulsi) @ 0.25 and 0.5% as compared to control, while Youssef *et al.* (2016) reported significant ($p < 0.05$) increase in body weight in broilers supplemented with ginger aqueous extract (1, 1.25, and 1.5%) and ginger oil extract (100, 150 and 200 mg). The reduction in feed intake observed during starter and finisher phase in $G_1$and T_2G_2 groups was compatible with *Qorbanpour et al.* (2018) following incorporation of ginger powder in broiler bird ration at 0.25% as compared to control. *Umaram* (2018) also reported numerically reduced feed intake during starter phase and significantly ($p < 0.05$) reduced feed intake during the finisher phase of the experiment in broiler supplemented a mixture of ginger and turmeric powder @ 0.75% each as compared to control group.

Table 1: Effect of tulsi leaf and ginger root powder on weight gain, feed intake and feed conversion ratio of broiler chicks

	Weight gain (g)		*Feed intake (g)*		*Feed conversion ratio*	
Treatment groups	*Starter (0-21 d)*	*Finisher (22-42 d)*	*Starter (0-21 d)*	*Finisher (22-42 d)*	*Starter (0-21 d)*	*Finisher (22-42 d)*
C	761.07^{a}	1223.87^{a}	1314.00^{c}	2605.67^{d}	1.73^{e}	2.13^{e}
T_1	808.97^{bc}	1368.84^{c}	1298.67^{c}	2536.00^{c}	1.61^{cd}	1.86^{c}
T_2	786.84^{b}	1302.60^{b}	1295.34^{c}	2529.34^{c}	1.65^{d}	1.95^{d}
G_1	788.57^{b}	1324.74^{bc}	1260.67^{b}	2377.34^{a}	1.60^{cd}	1.80^{bc}
G_2	817.24^{cd}	1431.67^{d}	1235.34^{ab}	2460.67^{b}	1.52^{ab}	1.73^{b}
T_1G_1	806.40^{bc}	1365.77^{c}	1242.34^{ab}	2453.34^{b}	1.55^{bc}	1.80^{bc}
T_2G_2	833.47^{d}	1538.27^{e}	1225.34^{a}	2521.67^{c}	1.48^{a}	1.64^{a}
SEM	7.4	16.61	8.21	16.88	0.02	0.03

Note: Means bearing different superscript in a column differ significantly ($p < 0.05$).

The positive effect of tulsi leaf and ginger powder in broiler diets on feed conversion ratio may be due to their antibacterial, anti-inflammatory, and antiprotozoal properties (Joshi *et al.,* 2009 and Zomrawi *et al*. 2012). The active ingredients found in tulsi leaf and ginger powder help in formation of more stable intestinal flora with decreased pathogenic bacteria, which resulted in better absorption of nutrients and increased feed conversion efficiency due to better digestion (Tekeli *et al.,* 2011 and Fakhim *et al.,* 2013). The results of FCR in both starter and finisher phase observed in the present study are in accordance with Reddy *et al.* (2012) who recorded best feed efficiency ($p < 0.01$) in 0.25% tulsi leaf powder and 0.25% herbal combination (Amla, Turmeric and Tulsi) groups during starter and finisher period of trial. Similarly, Youssef *et al.* (2016) reported significant ($p < 0.05$) improvement in FCR during starter phase when broilers were supplemented with ginger oil extract @ 150 mg and grower phase when broilers were supplemented with ginger aqueous extract (1, 1.25, and 1.5%) as compared to control.

Conclusion

Supplementation of tulsi leaf and ginger powder as feed additives each at 0.5% of ration could be beneficial in terms of improvement in growth performance of broilers.

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