

EFFECT OF DIETARY SUPPLEMENTATION OF TULSI (*OCIMUM SANCTUM*) LEAF POWDER AND FENUGREEK (*TRIGONELLA FOENUM GRAECUM L.*) SEED POWDER ON GROWTH PERFORMANCE IN BROILERS[#]

Umesh Kumar Prajapat¹, Dinesh Jain, R.K. Dhuria, T. Sharma, Tara Bothra², R. Nehra and Mangesh Kumar

Department of Animal Nutrition, College of Veterinary and Animal Science
Rajasthan University of Veterinary and Animal Sciences, Bikaner-334 001 Rajasthan, India

ABSTRACT

Received on: 03.08.2017

Accepted on: 09.01.2018

An experiment was conducted to assess the effect of dietary supplementation of Tulsi (*Ocimum sanctum*) leaf powder and fenugreek (*Trigonella foenum-graecum L.*) seed powder as herbal feed additives on feed intake and growth performance in broilers. A total of 210-day-old broiler chicks of Cobb-400 strain were divided into seven treatment groups with three replicates of 10 chicks in each replicate using completely randomized design. The control group (C) was fed on basal diet without any supplementation and other six treatment groups were supplemented with 0.5% Tulsi leaf powder, 1% Tulsi leaf powder, 0.5% fenugreek seed powder, 1% fenugreek seed powder, 0.25% Tulsi leaf powder + 0.25% fenugreek seed powder and 0.5% Tulsi leaf powder + 0.5% fenugreek seed powder in T₁, T₂, F₁, F₂, T₁F₁ and T₂F₂ groups, respectively. Statistical analysis of data revealed no significant effect of Tulsi and fenugreek supplementation alone or in combination on feed intake. The body weight and body weight gain was significantly higher (P<0.01) in Tulsi and fenugreek supplemented groups as compared to control with highest for T₁ group FCR was significantly (P<0.05) lower and PER was significantly (P<0.05) higher in the Tulsi and fenugreek supplemented groups compared to control group. It could be concluded that in high ambient temperature in heat stressed broilers inclusion of Tulsi leaf powder alone at 0.5% level, fenugreek seed powder alone at 0.5% level and combination of both i.e. Tulsi leaf powder and fenugreek seed powder at 0.5% level is quite effective and could be viable proposition for lucrative rearing of broilers for meat production.

Key words: Tulsi, fenugreek, broiler, FCR, PER

Introduction

The poultry industry is one of the most profitable ventures of agriculture and provides nutritious meat and eggs for human consumption (Rai *et al.*, 2012). Broiler production is the dynamic as well as the most rapidly expanding segment of the poultry industry in the country. The poultry farming in India occupies the top most position as compared to its other counterpart livestock with the annual growth rate of 8 and 15% in respect of egg and poultry meat production (Anonymous, 2007). Broiler industry throughout the world has registered a spectacular growth and has transformed itself from a mere backyard proposition into an agribusiness states (Singh *et al.*, 2015).

India is the fourth largest producer of poultry meat in the world and provides employment to 4.29 million people (Sasidhar and Suedi, 2015). The economics of poultry industry depends upon the feed. Over a period of time, extensive efforts have been taken to lower down the cost of production by lowering the expenses on feed. Feed additives are one of the important tools used for improving feed conversion ratio, growth rate and disease resistance. Feed additives are commonly described as non-nutrient substances which accelerate growth, efficiency of feed utilization, beneficial for health or metabolism of the animals (Church and Pond, 1988). The consumers nowadays are becoming more aware of safety and quality of food products consumed by them. The production of safer poultry products without any chemical and microbial residues in an economic manner is the order of the day.

Scientific evidence exist that herbs and plant extracts

stimulate the growth of beneficial bacteria and minimize pathogenic bacterial activity in the gastrointestinal tract of poultry (Gill, 1999; Langhout, 2000) and antioxidant properties (Faixova and Faix, 2008). The *Ocimum sanctum* is considered to be the "Queen of herbs" due to its greater medicinal values. It is well documented in the Hindu mythology about the Tulsi. In India, Tulsi is taken as the most sacred plant. *Ocimum sanctum* has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals and physical stress from prolonged physical exertion, ischaemia, physical restraint and exposure to cold and excessive noise. Addition of Tulsi leaf powder in feed showed significant decrease in lipid peroxidation level which shows its free radical scavenging property. Effect of fenugreek as natural feed additive on the performance of broiler chicks has also been widely noticed. Fenugreek seeds have been used extensively to prepare extracts and powders for medicinal uses (Basch *et al.*, 2003). It is reported to have anti-diabetic, anti-fertility, anti-cancer, anti-microbial, antiparasitic hypo-cholesterolaemic effects (Al-Habori and Roman, 2002) hypoglycaemic, anthelmintic, antibacterial, anti-inflammatory and antipyretic properties (Ahmadiani *et al.*, 2001; Basch *et al.*, 2003; Khan *et al.*, 2009). It has neurin, biotin, trimethylamine which tends to stimulate the appetite by their action on the nervous system (Michael and Kumawat, 2003).

Materials and Methods

A total of two hundred and ten-day-old broiler chicks of Cobb-400 strain were divided into seven treatment groups

[#]Part of M.V.Sc. Thesis. Corresponding author and present address Ph.D. Scholar, Dept. of Animal Nutrition, CVAS, RAJUVAS, Email: umeshkumarprajapat@gmail.com; ²Asstt. Prof. Dept. of Livestock Production, CVAS, Bikaner

Table 1: Proximate composition of broiler starter and finisher ration

Proximate Principle	Broiler starter	Broiler Finisher
Dry Matter (%)	92.45	94.30
Crude Protein (%)	22.50	21.20
Ether Extract (%)	04.30	05.50
Crude Fibre (%)	04.50	04.86
Total Ash (%)	10.80	09.72
Nitrogen Free Extract (%)	57.90	58.72

Table 2: Feed intake and growth performance of broilers birds in different dietary treatments

Parameter	C	T ₁	T ₂	F ₁	F ₂	T ₁ F ₁	T ₂ F ₂	SEM
Final body weight (g)	1202.08 ^a	1493.64 ^d	1358.12 ^b	1466.79 ^{cd}	1357.87 ^b	1457.16 ^c	1362.60 ^b	20.7552
Body weight gain (g)	1162.05 ^a	1453.07 ^d	1316.95 ^b	1425.32 ^{cd}	1316.37 ^b	1415.53 ^c	1321.10 ^b	20.8971
Feed consumption (g)	2411.84	2679.14	2573.30	2696.11	2530.39	2744.71	2576.01	56.3207
FCR	2.08 ^B	1.84 ^A	1.95 ^B	1.89 ^{AB}	1.92 ^{AB}	1.94 ^{AB}	1.95 ^{AB}	0.0272
PER	2.28 ^A	2.51 ^B	2.37 ^{AB}	2.44 ^{AB}	2.38 ^{AB}	2.39 ^{AB}	2.39 ^{AB}	0.0331

Means bearing different superscripts (a, b, c, d) in a row differ significantly (P<0.01)

Means bearing different superscripts (A, B) in a row differ significantly (P<0.05)

with 3 replicates of 10 chicks in each replication using completely randomized design (CRD). All experimental chicks were randomly assigned to 21 pens and identified with wing bands. The control group (C) was fed with basal diet without any supplementation and the treatment group T₁ and T₂ supplemented with 0.5% and 1% level of Tulsi leaf powder in the experimental broiler starter and finisher ration, respectively. Likewise F₁ and F₂ treatment group were supplemented with 0.5% and 1% level of fenugreek seed powder in the experimental broiler starter and finisher ration, respectively. T₁F₁ and T₂F₂ treatment groups were supplemented with 0.5% and 1% level of both Tulsi leaf powder and fenugreek seed powder in combination, respectively. The proximate composition of basal feed for starter and finisher phase of experimental birds is presented in Table 1. The experimental feed was analyzed by method of AOAC, 1995. The chicks were weighed individually at the start of the experiment and subsequently at weekly intervals for 6 weeks. The weekly average live weight gain was calculated from the difference in body weight attained at the end and the start of the concerned period. Feed consumption of each pen as recorded weekly. Feed conversion ratio (FCR) was calculated by dividing the cumulative feed intake by body weight gain of chicks for every week. The protein efficiency ratio (PER) was calculated as:

$$PER = \frac{\text{Body weight Gain (g)}}{\text{Protein Consumed (g)}}$$

Results and Discussion

The final body weight and body weight gain at the end of six weeks was higher in herbal supplemented groups than the control group indicating positive effect of Tulsi leaf powder and fenugreek seed powder in broilers. The body weight and body weight gain was significantly higher (p<0.01) in herbal supplemented group than control (Table 2). The significant improvement in body weight on account of supplementation of Tulsi leaf powder has also been reported by Lanjewar *et al.* (2008), Swathi *et al.* (2012) and Hasan *et al.* (2016). Significant improvement in body weight recorded in F₁ and F₂ as a result of fenugreek supplementation in present study corroborate

well with the finding of Elbushra (2012).

The average feed consumption by birds during the whole experimental period was comparable among different treatments (Table 2) indicating no adverse effect of above herbal feed additives on palatability and feed intake. Similar non-significant effects of Tulsi leaf powder supplementation on feed intake in broilers were also reported by Kumar *et al.* (2013), Hasan *et al.* (2016) and by Patel *et al.* (2014) in fenugreek seed powder supplementation.

The overall feed conversion ratio (FCR) for six weeks was significantly lower (p<0.05) in herbal feed additive supplemented groups than control. Among different treatment groups with lowest FCR in T₁ and highest FCR in control group. The results fall in line with findings of Swathi *et al.* (2012), Bhosale *et al.* (2015) recorded improvement in FCR with inclusion of Tulsi leaf powder as feed additive in the diet of broilers and Elbushra (2012), Mamoun *et al.* (2014) noticed improvement in FCR on inclusion of Fenugreek seed powder in diet of broilers.

The overall mean protein efficiency ratio calculated for all the treatment groups for entire period of six weeks revealed significant (p<0.05) effect in herbal feed additive supplemented groups than control. The highest PER is recorded for T₁ and lowest PER for control.

References

Ahmadiani A, Javan M, Semnani MA, Barat E and Kamalinejad M (2001) Anti-inflammatory and antipyretic effects of *Trigonella foenum-graecum* leaves extracts in rats. *J. Ethnopharma.* **75**: 283-286.

Al-Habori M and Roman A (2002) Pharmacological properties in Fenugreek-The genus *Trigonella* 1st ed., Petropoulos G A (eds), Taylor and Francis, London and New York, **10**: 163-182.

Anonymous (2007) Foreign Agricultural Service/USDA, Office of Global Analysis.

AOAC (1995) Official Methods of Analysis, 16thed. Association of Official Analytical Chemists, Washington, DC.

Basch E, Ulbricht C, Kuo G, Szapary P and Smith M (2003) Therapeutic applications of Fenugreek. *Alt. Med. Rev.* **8**: 20-27.

Bhosale DS, Bhagwat SR, Pawar MM and Kulkarni RC (2015) Comparative efficacy of dietary addition of Tulsi (*Ocimum sanctum*) leaf powder and vitamin E on broiler performance. *Indian J. Anim. Nutr.* **32**(3): 348-350.

Church DC and Pond WG (1988) In: Basic Animal Nutrition and Feeding. 3rd ed., John Wiley and Sons, Toronto, pp: 267-275.

Elbushra ME (2012) Effect of dietary Fenugreek Seeds (*Trigonella foenum*) as natural feed addition on broiler chicks performance. *J. Sci. Tech.* **13**(2): 27-33.

Faixova Z and Faix S (2008) Biological effects of Rosemary essential oil. *Folia Veterinaria.* **52**: 135-139.

Gill C (1999) Herbs and plant extracts as growth enhancers.

- Feed Int.* **20**(4): 20-23.
- Hasan MN, Mostofa M, Sorwar MG, Hasan MT, Das K and Hossain DMN (2016) Effects of Tulsi leaf extract on body weight gain in broiler production. *Bangladesh J. Vet. Med.* **14**(1): 21-25.
- Khan FU, Durrani FR, Sultan A, Khan RU and Naz S (2009) Effect of Fenugreek (*Trigonella foenum-graecum*) seed extract on visceral organs of broiler chick. *J. Agr. Bio. Sci.* **4**:58-61.
- Kumar VP, Sasikumar P, Pangayarselvi B, Chandrasekaran D, Doraisamy KA, Senthilkumar S and Purushothaman MR (2013) Performance of broiler chicken fed Tulsi leaf powder and leaf extract supplemented diets during summer to alleviate heat stress. *Indian J. Anim. Sci.* **83**(9): 930-931.
- Langhout P (2000) New additives for broiler chickens. *World Poultry Elsevier.* **16**(3): 22-27.
- Lanjewar RD, Zanzad AA, Ramteke BN and Deshmukh GB (2008) Effect of dietary supplementation of Tulsi (*O. sanctum*) leaf powder on the growth performance and serum lipid profile in broilers. *Indian J. Anim. Nutr.* **25**(4): 395-397.
- Mamoun T, Mukhtar MA and Tabidi MH (2014) Effect of fenugreek seed powder on the performance, carcass characteristics and some blood serum attributes. *Res. Agr. Vet. Sci.* **1**(1): 6-11.
- Michael D and Kumawat D (2003) Legend and archaeology of Fenugreek, constitutions and modern applications of Fenugreek seeds. *Int. Symp. USA*, pp. 41-42.
- Patel RM, Garg DD, Patel VR, Vahora SG, Katariya MA and Choubey M (2014) Effect of dietary supplementation of garlic (*Allium sativum*) and fenugreek (*Trigonella foenum-graecum* L.) seed powder on growth performance and blood biochemical parameters in broilers. *Indian J. Poult. Sci.* **49**(1): 17-20.
- Rai RB, Dhama K, Damodaran T, Ali H, Rai S, Singh B and Bhatt P (2012) Evaluation of azolla (*Azolla pinnata*) as poultry feed and its role in poverty alleviation among landless people in northern plains of India. *Vet. Pract.* **13**(2): 250-254.
- Sasidhar PVK and Suvedi M (2015) Integrated contract broiler farming: An evaluation case study in India. MEAS Evaluation Report, USAID.
- Singh N, Santra AK, Dutta GK, Gendley MK, Chaurasia D and Deshmukh S (2015) Studies on the welfare indicators like haematological and biochemical parameters of commercial broiler chicks raised in different stocking densities. *Vet. Pract.* **16**(2): 219-221.
- Swathi B, Gupta PSP and Nagalakshmi D (2012) Effect of Tulsi (*Ocimum sanctum*) and Turmeric (*Curcuma longa*) on broiler performance and blood constituents during heat stress in broilers. *Int. J. Pharm. Bio. Sci.* **3**(3): 446-453.