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Effect of fenugreek (*Trigonella foenum-graecum* L.) seed powder as feed additive on carcass traits and haemato-biochemical attributes of commercial broiler chicken

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Abstract

A study was undertaken to investigate the effect of dietary fenugreek (*Trigonella foenum-graecum* L.) seed powder on growth performance of commercial broiler chicken. Study was conducted for six weeks, a total of one hundred fifty-day-old commercial broiler chicks (Cobb-400) with uniform body weight were randomly divided into five groups viz. T₀ (standard basal diet as control), T₁ (Basal diet + 0.25% fenugreek seed powder), T₂ (Basal diet + 0.50% fenugreek seed powder), T₃ (Basal diet + 0.75% fenugreek seed powder) and T₄ (Basal diet + 1% fenugreek seed powder) comprising 30 chicks in each group with 3 replications of 10 chicks in each. The results showed that there was no significant difference in dressing percentage, giblet yield, cut-up parts and relative organs between control and treatment groups. A 0.50% fenugreek seed powder enhanced serum glucose level ($p \leq 0.05$) but values were within normal range. The study revealed that there was significant different found in pre-slaughtered live weight, dressed weight and abdominal fat and insignificant different on haemato-biochemical parameters except for serum glucose.

Keywords: Broiler, dressing percentage, giblet yield, cut-up part and relative organ

Introduction

Poultry industry in India is one of the fastest growing and expanding segments of the agricultural and animal husbandry sectors due to its low investments and quick returns. Now-a-days broiler farming has become the most popular and profitable income generating enterprises for the educated unemployed youths. Most of the poultry farmers are interested in broiler production due to its shorter generation interval among other types of livestock production and also because it produces the largest number of offspring. In poultry production one of the possible alternatives reported for the normal growth, health and productive performance of birds are phyto biotics additives which include a group of natural feed additives; derived from herbs, spices and essential oils all serves as source for bioactive ingredients (Windisch *et al.*, 2008) [16]. The herbal medicine was beneficial for the performance of broilers due to their stimulatory secretion of digestive enzymes and intestinal mucous to stabilize microbial balance and feed digestion in the gut (Elbushra, 2012) [8]. Since long fenugreek (*Trigonella foenum-graecum*), locally known as Methi has been used as a feed additive particularly in the diet of broiler chicken and inclusion of fenugreek seeds in the diet significantly enhances growth and feed intake of broiler chicken by building better immunity (Yatoo *et al.*, 2012 and Quershi *et al.*, 2015) [18, 14]. Fenugreek seeds have many therapeutic effects like anti-parasitic, anti-helminthic, anti-diabetic, anti-fertility, anti-cancer, anti-bacterial, anti-inflammatory, anti-pyretic, and anti-microbial properties (Basch *et al.*, 2003; Mamoun *et al.*, 2014) [4, 11]. Fenugreek seed is an excellent source of minerals like iron, copper, selenium, zinc, calcium, potassium, magnesium and manganese and also an excellent source of many vital vitamins like thiamine, pyridoxine, riboflavin, vitamin A and C, (Michael and Kumawat, 2003) [13]. Fenugreek seeds also contain biotin, neurin and trimethylamine properties which by their action on the nervous system tends to stimulate the appetite of the bird (Al Habori and Raman, 2002) [2]. Fenugreek seeds also contain components like lecithin and choline that helps to dissolve cholesterol and fatty substances (Dixit *et al.*, 2005) [6]. Considering the above facts in view the present study was undertaken to determine dietary

Supplementation of fenugreek seed powder on the performance of broiler chicken fed at different levels with feeds.

Material and Method

The trial was conducted in the experimental poultry shed of the Instructional Poultry Farm, C.V. Sc, Khanapara, Guwahati with 150 number of day-old broiler chicks having uniform body weight from a single hatch. The chicks were randomly divided into five groups viz. T₀, T₁, T₂, T₃ and T₄ comprising of 30 chicks in each group. Each group was further subdivided into 3 replicates of 10 chicks in each. The chicks were wing banded and reared under deep litter system of management. The control group (T₀) was fed with basal diet without any supplementation and the treatment groups T₁, T₂,

T₃ and T₄ were supplemented with fenugreek seed powder at the rate of 0.25, 0.50, 0.75 and 1.0 percent respectively. The chicks were fed with broiler pre starter (0-10 days), starter (11-28 days) and finisher (29-42 days) diets as per BIS (2007) [5]. The composition and nutrient levels of basal diet are shown in Table 1. All the birds were offered ad libitum drinking water and feed throughout the experimental period of six weeks. The chicks were kept in deep litter system using fresh paddy husk as a litter bedding material throughout the experimental period following standard hygienic and uniform managemental procedures. Chicks were medicated and vaccinated as per standard schedule. The carcass traits and haemato-biochemical parameters were calculated as per standard methods. One Way Analysis of Variance was performed by software SPSS and excel-2019.

Table 1: Ingredients and nutrient composition of basal diet (broiler pre-starter, starter and finisher).

Ingredients (Kg)	Pre-starter (0-10 days)	Starter (11-28 days)	Finisher (29-42 days)
Maize	45.0	43.7	49.0
Rice polish	7.0	10.0	10.0
Ground nut cake	17.0	10.0	10.0
Soya bean meal	25.5	28.0	22.7
Vegetable oil	3.0	6.0	6.0
Mineral mixture	2.0	2.0	2.0
Salt	0.5	0.3	0.3
Nutrient composition			
Dry matter (%)	86.90	88.40	86.60
Crude protein (%)	23.63	21.92	20.06
Ether extract (%)	3.15	3.47	3.64
Crude fibre (%)	4.60	4.19	4.92
Nitrogen free extract (%)	35.48	33.51	32.31
Total ash (%)	4.10	3.93	3.69
Metabolizable energy (Kcal/Kg)*	2907.75	3086.10	3141.75

*Calculated values (N.B. Vitamin premix Alvite-M was added @20g per quintal of ration in pre-starter, starter and finisher diet.)

Results and Discussion

Carcass traits

Carcass quality traits

All carcass traits (pre-slaughter live weight, dressed weight, dressing percentage, giblet weight and giblet yield) except pre-slaughter live weight and dressed weight recorded in the present study did not differ significantly ($p>0.05$) among the different groups (Table 2). Similar results were observed in the line findings of Alloui *et al.* (2012) [3] who found that

feeding FSP insignificantly ($p>0.05$) affected slaughter parameters (dressing percentage and carcass length). However, the values of dressing percent was substantially influenced in all the treatment groups receiving the supplementary diet FSP compared to the control group. These results were accordance with the findings of Abbas (2010) [1] and Mamoun *et al.* (2014) [11] this may be due to the fact that FSP contain protein which has higher digestibility that helps in better muscular development (Yesuf *et al.*, 2017) [19].

Table 2: Mean±SE carcass traits of broiler chicken (on pre-slaughtered live weight basis) in different treatment groups.

Parameters	Groups				
	T ₀	T ₁	T ₂	T ₃	T ₄
Pre-slaughtered live Weight (g)	1703.33 ^a ±80.22	1832.00 ^b ±33.24	1880.33 ^c ±22.25	1985.66 ^d ±36.87	1994.66 ^d ±12.38
Dressed weight (g)	1201.00 ^a ±70.92	1324.00 ^b ±9.84	1373.00 ^c ±33.42	1429.00 ^d ±19.42	1447.66 ^d ±8.35
Dressing percentage%	70.44 ^a ±1.45	72.29 ^a ±0.83	73.00 ^a ±1.12	71.97 ^a ±0.35	72.58 ^a ±0.78
Giblet weight (g)	81.33 ^a ±2.02	78.66 ^a ±5.04	83.00 ^a ±1.73	83.00 ^a ±4.00	93.00 ^a ±6.02
Giblet yield%	4.79 ^a ±0.25	4.29 ^a ±0.28	4.41 ^a ±0.04	4.17 ^a ±0.16	4.65 ^a ±0.27

Means bearing different superscripts in a row differ significantly ($p\leq0.05$)

The percent yields of cut-up parts (Table 3) like neck, wings, back, breast, thighs and drumsticks did not differ significantly ($p>0.05$) among the different treatments. The result with respect to FSP are also in agreement with the findings of Abbas (2010) [1], Mamoun *et al.* (2014) [11] and Yesuf *et al.* (2017) [19] who reported that FSP had no significant influence

on carcass characteristics of broiler chickens. The overall weight of the cut-up parts was proportionately higher among the chickens receiving supplementary FSP diet, which may be due to appropriate utilization of protein which are made available in the feeds of the chickens (Elbushra, 2012) [8].

Table 3: Mean ± SE percent yield cut-up parts of broiler chicken (On pre-slaughtered live weight basis) in different treatment groups.

Parameters	Groups				
	T ₀	T ₁	T ₂	T ₃	T ₄
Neck	3.34±0.07	3.32±0.42	3.69±0.23	3.79±0.58	3.46±0.70
Wings	7.76±0.43	8.27±0.66	7.35±0.91	6.45±0.76	6.68±0.15
Back	10.35±1.61	10.19±0.23	9.27±0.22	10.40±0.59	10.80±1.64
Breast	20.72±0.53	22.07±1.22	23.63±0.56	23.04±0.63	24.85±1.53
Thighs	16.78±0.06	16.90±0.87	17.62±0.55	16.88±0.55	17.62±0.44
Drumsticks	10.66±0.18	10.74±0.13	10.45±0.10	9.72±0.30	10.53±0.34

Relative organs including lymphoid organs

The mean (±SE) percent weights of relative organs (liver, heart, gizzard, kidneys, pancreas and abdominal fat) including lymphoid organs (spleen and bursa of fabricius) of broiler chicken except for abdominal fats did not differ significantly ($p>0.05$) among the different treatment groups (Table 4). Medina *et al.* (2020) [12] and Yesuf *et al.* (2017) [19] also found significant ($p<0.05$) influence on abdominal fat percent due to

feeding of FSP in the diet of broiler chicken. Contradictory findings were reported by Dixit *et al.* (2005) [6] who observed that FSP had fat reducing activity due to presence of lecithin and choline. Abbas (2010) [1] and Hamid *et al.* (2018) [10] also found that the relative weights of the gizzard, liver, spleen and heart percentages were non-significantly ($p>0.05$) affected by the dietary fenugreek powder.

Table 4: Mean±SE percent weights of relative organs including lymphoid organs of broiler chicken (on pre-slaughtered live weight basis) in different treatment groups

Parameters	Groups				
	T ₀	T ₁	T ₂	T ₃	T ₄
Liver	2.79±0.28	2.13±0.06	2.41±0.05	2.26±0.08	2.32±0.12
Heart	0.44±0.55	0.41±0.02	0.44±0.05	0.46±0.08	0.43±0.36
Gizzard	1.51±0.08	1.74±0.27	1.55±0.07	1.44±0.24	1.90±0.19
Kidney	0.88±0.08	0.87±0.01	0.76±0.06	0.72±0.07	0.78±0.06
Pancreas	0.19±0.45	0.21±0.03	0.26±0.07	0.23±0.04	0.26±0.01
Abdominal fat	0.91 ^a ±0.19	0.81 ^a ±0.09	1.73 ^c ±0.18	1.30 ^a ±0.41	1.77 ^c ±0.14
Lymphoid organs					
Spleen	0.13±0.02	0.10±0.03	0.12±0.01	0.20±0.04	0.16±0.04
Bursa of Fabricius	0.73±0.44	0.30±0.12	0.39±0.17	0.40±0.12	0.32±0.24

Means bearing different superscripts in a row differ significantly ($p\leq0.05$)

Biochemical parameters

The mean (±SE) values of all the serum biochemical parameters (serum protein, glucose, triglycerides, cholesterol, GGT, albumin and bilirubin) estimated in the present study except for serum glucose did not differ significantly ($p>0.05$) among the different experimental groups (Table 5). However, the values of serum glucose were within normal ranges. The present findings were in close agreement with the reports of Weerasingha and Atapattu (2013) [15] and Mamoun *et al.* (2014) [11] who indicated that supplementation of FSP did not significantly ($p>0.05$) influence the serum biochemical parameters like serum cholesterol and triglycerides among the

control and FSP treated groups of broilers chicken. Similar conclusions were also drawn by Qureshi *et al.* (2015) [14] who observed no significant ($p>0.05$) differences in the total serum protein values of broilers provided incorporation diet with fenugreek seed powder. Increase glucose level with incorporation of FSP was in line with Duru *et al.* (2013) [7] who reported significant ($p\leq0.05$) increase in the glucose level. They assumed that increase in glucose level could be due to the presence of high fiber and saponin content in the seeds of FSP which caused mechanical satiety which led to low soluble carbohydrate consumption.

Table 5: Mean±SE for biochemical parameters of broiler chicken in different treatment groups

Parameters	Groups				
	T ₀	T ₁	T ₂	T ₃	T ₄
Serum protein (mg/dl)	3.68 ^a ±0.11	3.74 ^a ±0.07	3.47 ^a ±0.04	3.73 ^a ±0.05	3.57 ^a ±0.18
Serum glucose (mg/dl)	233.97 ^a ±0.79	232.21 ^a ±4.87	252.82 ^c ±9.28	236.60 ^b ±6.93	250.26 ^c ±3.88
Triglyceride (mg/dl)	152.23 ^a ±11.39	151.66 ^a ±8.84	140.77 ^a ±24.41	140.57 ^a ±7.60	139.50 ^a ±10.95
Total serum cholesterol (mg/dl)	142.19 ^a ±17.95	131.53 ^a ±1895	120.98 ^a ±4.26	119.53 ^a ±6.23	133.54 ^a ±12.25
GGT (u/l)	24.69 ^a ±1.04	24.06±1.00	22.68 ^a ±1.78	25.84 ^a ±4.28	23.11 ^a ±2.13
Albumin (g/dl)	1.59 ^a ±0.08	1.70 ^a ±0.36	1.81 ^a ±0.29	1.56 ^a ±0.28	1.74 ^a ±0.23
Total bilirubin (mg/dl)	0.38 ^a ±0.04	0.37 ^a ±0.01	0.34 ^a ±0.02	0.39 ^a ±0.02	0.36 ^a ±0.01
Direct bilirubin (mg/dl)	0.08 ^a ±0.02	0.09 ^a ±0.01	0.07 ^a ±0.01	0.09 ^a ±0.02	0.09 ^a ±0.01

Means bearing different superscripts in a row differ significantly ($p\leq0.05$)

Similarly, Duru *et al.* (2013) [7], Mamoun *et al.* (2014) [11] and Qureshi *et al.* (2015) [14] reported that feeding commercial broiler chicks on diet containing fenugreek seed powder lowered cholesterol levels. However, there was no significant difference in values of these parameters between the control

and treatment group. There is always an apprehension about effect of any herbal supplement on the vital organs such as liver that could have a negative effect on the production parameters. In the present study the fenugreek supplementation does not appear to have any significant

influence on hepatic activity as evidenced from the serum GGT activity, serum albumin and serum bilirubin and the values of all the biochemical parameters found in the present study were within normal ranges for healthy boiler chickens and this implied that use of FSP in broiler production with the present levels is safe and healthy.

Haematological parameters

In the present study, no significant ($p>0.05$) differences in haemoglobin and packed cell volume values were observed among the different treatment groups (Table 6). However,

increased concentration of haemoglobin and packed cell volume were found in all treatment groups as compared to control group. Similar findings with respect to higher concentration values due to dietary supplementation of FSP in broiler chicks as compared to control group were also observed by several workers like Yattoo *et al.* (2012) [18] and Yasar *et al.* (2012) [17]. This increase in concentration of haemoglobin and packed cell volume percentage in all treatment groups may be due to the antioxidant activity of fenugreek seeds (Erin *et al.*, 1983) [9].

Table 6: Mean±SE for haematological parameters of broiler chicken in different treatment groups

Parameters	Groups				
	T ₀	T ₁	T ₂	T ₃	T ₄
Haemoglobin (g/dl)	9.59±0.26	9.80±0.24	9.99±0.15	9.77±0.13	9.72±0.16
PCV (%)	33.18±1.08	35.15±0.23	33.14±1.05	33.94±0.16	34.47±0.94

Conclusion

A batch of one-hundred-and-fifty-day-old commercial broiler chicks (Cobb-400) having similar body weight were randomly divided into five experimental groups *viz.* T₀ (standard basal diet as control), T₁ (basal diet + 0.25% fenugreek seed powder), T₂ (basal diet + 0.50% fenugreek seed powder), T₃ (basal diet + 0.75% fenugreek seed powder) and T₄ (basal diet + 1% fenugreek seed powder) comprising 30 chicks in each group with 3 replications of 10 chicks in each. The results showed that there was no significant difference in dressing percentage, giblet yield, cut-up parts and relative organs between control and treatment groups. A 0.50% fenugreek seed powder enhanced serum glucose level ($p\leq 0.05$) but values were within normal range. The study revealed that there was significant difference found in pre-slaughtered live weight, dressed weight and abdominal fat and insignificant difference on haemato-biochemical parameters except for serum glucose. Thus, it can be concluded that fenugreek seed powder has no important effect on carcass characteristics except for pre-slaughtered live weight, dressed weight and abdominal fat and on haemato-biochemical parameters except for serum glucose.

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