

Effect of Dietary Fenugreek Seed Powder on Broiler Chicks Performance

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Abstract. An experiment was conducted to assess the effect of fenugreek seed powder as feed additive on performance and blood chemistry of broiler chicks. 96 unsexed broiler chicks (hubbard) were divided randomly into four group, each represented a treatment (24 birds/treatment) with 4 replicates in a completely randomized design. The experimental basal rations were formulated to meet requirement for essential nutrients for broiler chicks according to NRC (1994) recommendation. Four graded levels of fenugreek seed powder 0%, 0.5%, 1% and 1.5% were used. The experiment lasted for six weeks. Blood chemistry and carcass characteristics were measured. Overall feed intake, live body weight, haven't shown any significant ($p>0.05$) differences between treatments groups, Weight gain and feed conversion ratio were significantly affected ($P<0.05$), birds fed 0.5% fenugreek seeds powder were recorded highest weight gain and lowest feed conversion ratio. Internal organs weights were not significantly ($P>0.05$) influenced by the dietary treatments. Blood parameters weren't significantly ($p>0.05$) affected, PCV, MCH, MCHC, RBCS and WBC, significant ($P<0.05$) increased in HB plasma was observed. No significant ($p>0.05$) different was recorded in cholesterol level between experimental groups. Inclusion of fenugreek seeds powder has good effect on broiler chicks performance.

Keywords. Feed additives, Fenugreek, Broiler.

1. Introduction

Medicinal herbs have become important in the field of Animal and agricultural production because they contain natural chemical compounds of great interest in the field of treatment and nutrition for humans and animals. Studies have shown that Medicinal plants have the ability to treat many diseases and the effective compounds derived from medicinal plants have the ability to treatment of diseases and improvement of food.

Fenugreek (*Trigonella foenum graecum*) natively known as Hulabah is one of the oldest medicinal plant and Fenugreek seed is an important source of steroidal saponins such as diosgenin which are used extensively by both pharmaceutical and nutritional industries.

Saponins are common in a large number of plants and plant products and playing an important role in human and animal nutrition. Saponins have biological role as membrane-permeabilizing, immunostimulant and hypocholesterolemic properties and it was found to have significant effects on growth and feed intake in animals. These compounds have been observed to improve the protein digestion and the uptake of vitamins and minerals in gut and act as hypoglycemic agent [1]. However, animal nutritionists have generally considered saponin to be deleterious compounds.

Fenugreek is one of the herbs having multifunctional characteristics. It is a good source of dietary protein for consumption by human and animals, and good source of protein, fiber, ash, and carbohydrate; it is rich in minerals such as Ca, Na and Cu. [2, 3]. Fenugreek seed and leaves have medicinal value, and have been used to reduce blood sugar and lower blood cholesterol in humans and animals [4].

Seeds are considered as an appetizer and helps in digestion; improve growth performance and health [5, 6].

Several investigators reported that supplementation of poultry diets with fenugreek seed lower plasma total lipids and total cholesterol in Broiler chicks [7] and improve the reproductive and physiological performance of rabbit and mouse and broiler breeder males [8].

Many researchers have suggested that it has been used extensively in the past as hay, green fodder and silage, and as a supplement with other animal feed [9-11]. In addition, Fenugreek is usually used to treat loss of appetite and to address weight. The significant improvement in body weight gain and dressing percentage in broiler chicks fed diets containing Fenugreek was reported by [12]. Therefore the objectives of the present study were to evaluate the effects of different dietary levels of Fenugreek seed powder supplementation as feed additives on Broiler performance, Blood chemistry.

2. Materials and Methods

2.1. Experimental Diets

Fenugreek seeds obtained and then was milled, Sample of fenugreek seeds powder was taken for further analysis according to method of analysis, proximate chemical composition of raw fenugreek seeds powder is present in Table (1). Four experimental diets were formulated according to the recommended nutrients requirement standard of broiler chicks as outlined by National Research Council [13]. In addition to control diet 0% fenugreek seeds powder, three other dietary treatments were formulated to contain 0.5%, 1%, and 1.5% fenugreek seed powder, calculated and proximate analysis of the experimental diet was shown in table (2).

Table 1. Percent Composition of Powder of Fenugreek Seeds.

Constituents	Percent
Dry matter	92.00
Ash	4.89
Crude protein	25.69
Ether extrat	7.20
Crude fiber	8.60mi
Metabolizable energy MJ/Kg DM	13.193

Tables 2. The formulation and calculated analysis of experimental diets.

Ingredient %	Control %	0.5 %	1 %	1.5 %
Sorghum	66.4	66.18	66.94	66.74
Groundnut cake	17.5	17.72	17.46	13.86
Sesame cake	9.5	9	8	11.3
Concentrate	5	5	5	5
Fenugreek	0	0.5	1	1.5
Dicalcium phosphate	1	1	1	1
Nal	0.25	0.25	0.25	0.25
Methionine	0.05	0.05	0.05	0.05
Lysine	0.05	0.05	0.05	0.05
Total	100	100	100	100
Calculated analysis:				
Energy kcal/kg %	3130.27	3114.91	3106.2	3092.44
Crude protein %	22.36	22.35	22.05	21.95
Crude fiber %	4.225	4.243	4.198	4.156
Ether extract %	4.46	4.444	4.351	4.515
Ash %	5.303	5.274	5.152	5.296
NFE %	55.33	55.13	55.44	55
Ca %	1.053	1.044	1.023	1.066
T.P %	0.822	0.818	0.81	0.82
Methionine %	0.501	0.489	0.427	0.5
Lysine %	1.103	1.101	1.09	1.074

2.2. Experimental Birds and Management

96 Broiler chicks (Hubbard) were purchased from Dajin Poultry Company (Mico). Upon arrival, the chicks were given solution mixture of vitamins and sugars in drinking water to reduce transportation stress and were fed pre-starter (Galdus Koudijs) diet for week (adaptation period The average weight of the chicks at one day old was 41/g/ chick), then the chicks were randomly distributed into 12 experimental pens. Feed and water were provided ad libitum through for the experimental period (6 weeks). The birds were vaccinated against infectious bronchitis disease (IBD) and Newcastle disease at age of 7 days and 29 days, Gamburo disease at age of 14 days and 20 days.

2.3. Statistical Analysis

The design used was complete randomized design. Data were statistically analyzed with the standard procedures of analysis of variance (ANOVA). Differences between treatment means were tested using the Duncan's multiple Range Test.

3. Results

Overall growth performance of broiler Chicks fed different experimental diets throughout the six weeks period were illustrated in Table (3). Result indicated that, overall feed intake, live body weight haven't shown any significant ($p > 0.05$) differences between treatments group, weight gain and feed conversion ratio were significantly ($P < 0.05$) affected by dietary treatments, 0.5% treatment recorded highest weight gain and lowest feed conversion ratio.

Table 3. Overall performance of broilers as affected by dietary inclusion of Fenugreek Seed Powder.

Parameters	levels of Fenugreek Seed Powder %				SEM	Sig
	0 %	0.5 %	1 %	1.5 %		
Feed intake, g/bird	4290	4136	4160	4213	68.827	NS
Final body weight	2684	2626.5	2610	2756	50.187	NS
Weight gain	2261 ^a	2406 ^b	2405 ^b	2362 ^{ab}	39.25	*
Feed conversion ratio	1.75 ^b	1.55 ^a	1.57 ^{ab}	1.63 ^{ab}	0.055	*

a, b = mean with different superscripts along rows are significantly different (p<0.05).

NS = non- significant difference (p>0.05)

S.E.M = Standard error of the means.

The internal organs weights were not significantly (P>0.05) influenced by the dietary treatments (Table 5).

Table 4. Carcass Parameters of Broilers Chicks fed Fenugreek Seed Powder.

Parameters	levels of Fenugreek Seed Powder %				SEM	Sig
	0 %	0.5 %	1 %	1.5 %		
Pre-slaughter weight gm/bird	2684.10 ^a	2626.57 ^b	2610.00 ^{ab}	2755.57 ^{ab}	50.19	*
Carcass weight gm/bird	1766.13	1811.67	1766.10	1878.33	43.58	NS
Dressing Percent %	65.767 ^a	69.000 ^b	67.700 ^{ab}	68.233 ^{ab}	0.788	*

a, b = mean with different superscripts along rows are significantly different (p<0.05).

NS = non- significant difference (p>0.05)

S.E.M = Standard error of the means.

Table 5. Internal organs weight (gm) of broilers fed Fenugreek Seed Powder.

Age in week	levels of Fenugreek Seed Powder %				SEM	Sig
	0 %	0.5 %	1 %	1.5 %		
Gizzard (gm)	105	388	395	392	243.16	NS
Intestine (gm)	108	641	667	108	192.17	NS
Neck (gm)	110	106	411	114	142.28	NS
Heart (gm)	121	115	115	110	3.95	NS
Liver (gm)	563	496	496	556	31.92	NS

a, b = mean with different superscripts along rows are significantly different (p<0.05).

NS = non- significant difference (p>0.05)

S.E.M = Standard error of the means.

Effects of Fenugreek Seed Powder on blood parameters shown in Table (6), addition of Fenugreek Seed Powder in the broiler Chicks diet wasn't significantly (p>0.05) affected, PCV, MCH, MCHC, RBCS and WBC, significant (P<0.05) increased in HB plasma was observed. No significant (p>0.05) different was recorded in cholesterol level between experimental groups.

Table 6. Serum cholesterol and hematological parameters of broilers fed Fenugreek Seed Powder.

Parameters	levels of Fenugreek Seed Powder %				SEM	Sig
	0 %	0.5 %	1 %	1.5 %		
Hbmg/dl	13.43 ^{ab}	14.13 ^b	13.65 ^b	12.69 ^a	0.23	*
PCV %	30.44	31.92	31.65	29.55	0.77	NS
MCH	23.40	23.18	22.59	23.21	1.01	NS
MCHC	44.26	44.48	44.33	43.06	1.03	NS
RBC count/ UL	5.91	6.19	6.35	5.49	0.30	NS
WBC count/UL	6.42	7.73	6.59	5.98	0.56	NS
Cholesterol/mg/dl	74.27	71.08	68.95	66.83	2.55	NS

a, b = mean with different superscripts along rows are significantly different (p<0.05).

NS = non- significant difference (p>0.05)

S.E.M = Standard error of the means.

4. Discussion

With respect to insignificant effect of dietary inclusion of fenugreek seed powder on feed consumption of the birds fed 0.05% fenugreek seed powder compare to the control group, this result agreed with [14, 15] who reported that there were no effects of supplemented fenugreek on feed consumption for laying hens and broilers respectively.

Supplementation of fenugreek seed powder improved live body weight. This might be due to the presence of the fatty acids [16] or due to stimulating effect on the digestive system of broilers [17].

The apparent health of the experimental chicks was good throughout the experimental period for all treatments and no mortality was recorded. This might be due to supplementation of fenugreek seed powder.

Feed conversion ratio and weight gain were improved for chicks fed on diet supplemented by 0.5 % fenugreek seed powder.

Highest dressing percentage was recorded for group fed 0.5%. Internal organs weight gizzard, intestine, neck, heart and liver weren't differing between treatments groups.

With respect to the effect of treatments levels on cholesterol and hematological parameters, it is obvious that PCV, MCH, MCHC, RBCs, and WBC were not affected by treatment diets. Significant highering effects of HB on groups fed 0.5% and 1% fenugreek seed powder, this effect may be due to its active ingredients such as saponins, hemicelluloses, mucilage, tannin and pectin and these compounds help lower blood cholesterol levels by inhibiting bile salts.

References

- [1] Francis, G., et al., The biological action of saponins in animal systems: a review. *British journal of Nutrition*, 2002. 88(6): p. 587-605.
- [2] Patil, S.P., P.V. Niphadkar, and M.M. Bapat, Allergy to fenugreek (*Trigonella foenum graecum*). *Annals of Allergy, Asthma & Immunology*, 1997. 78(3): p. 297-300.
- [3] ANONYMOUS, *Trigonella foenum-graceum*. [<http://www.haad.ae/HAAD/Link.Click.aspx?fileticket=2QP5iAkuUm8%3D&ta id= 791>], (2011a).
- [4] Dahanukar, S., R. Kulkarni, and N. Rege, *Pharmacology of medicinal plants and natural products*. *Indian journal of pharmacology*, 2000. 32(4): p. S81-S118.
- [5] Sandoval, M., et al., Effect of dietary zinc source and method of oral administration on performance and tissue trace mineral concentration of broiler chicks. *Journal of animal Science*, 1999. 77(7): p. 1788-1799.
- [6] Hussein, M.A. and A.N. Zaki, Effect of Adding Fenugreek Oil to Diet on Productive Performance of Broiler Chicks. *Energy (kg kcal)*. 1(3027): p. 3195.3.
- [7] HM, A., Effect of hot pepper and fenugreek seeds supplementation on broiler diets. Ph D Thesis, Faculty of Agriculture, Alexandria University, Egypt., 2001.
- [8] Taha., A.T., The Role of Vitamins A ,C and Fenugreek Seeds in Lowering Oxidative Stress Effect on Physiological and Reproductive Performance of Males Broiler Breeder. PhD. Thesis, College of Agriculture and forestry, University of Mosul., 2008.
- [9] Rouk, H. and H. Mangesha, Fenugreek (*Trigonella foenum-graecum L.*) its relationship, geography and economic importance, *Exper Stat Bull No. 20*, Imper. Ethiopian College of Agric. & Mech. Arts, 1963.
- [10] Hardman, R., *Pharmaceutical products from plant steroids*. 1969.
- [11] Smith, A., Selected markets for turmeric, coriander seed, cumin seed, fenugreek seed and curry powder. 1982.
- [12] Morsy, M.M.A., The use of fenugreek (*Trigonella foenum graecum*), clove (*Syzygium Aromaticum*) in broiler nutrition as feed additives. M.Sc. Thesis, Fac. of Agric, Alexandria Univ, Egypt., 1995.
- [13] Council, N.R., *Nutrient requirements of poultry: 1994*. 1994: National Academies Press.
- [14] El-Kaiaty, A., A. Soliman, and M. Hassan, The physiological and immunological effects of some natural feed additives in layer hen diets. *Egypt Poult Sci*, 2002. 22: p. 175-183.
- [15] Radwan, N., L. , Effect of using some medicinal plants on performance and immunity of broiler chicks. Ph. D. Thesis, Fac. Of Agric., Cairo Univ., Egypt., 2003.
- [16] Murray, R., et al., *The text book of Harper's biochemistry*. Appleton and Large, Norwalk, Connecticut, Las Altos, Callifornia, 1991.

- [17]Hernandez, F., et al., Influence of two plant extracts on broilers performance, digestibility, and digestive organ size. *Poultry science*, 2004. 83(2): p. 169-174.

