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ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

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Effect of Using Fenugreek, Parsley and Sweet Basil Seeds as Feed Additives on the Performance of Broiler Chickens

Rabia J. Abbas
Department of Animal Production, College of Agriculture, University of Basra, Basra, Iraq

Abstract: A research study was conducted to find the effect of Fenugreek *(Trigonella Foenum-Graecum* L.), parsley (*Petroselium sativam* L.*)* and Sweet Basil (*Ocimum basilicum* L.) seeds as natural feed additives on broiler performance. A total of 120 day-old chicks were reared for 42 days. Feed and water were provided *ad libitum*. Chicks were divided into four treatments (30 birds each). Each treatment contained three replicates of 10 birds. Each treatment was fed on one of the following experimental diets:1) Control diets (without supplementation). 2) Control diets supplied with Fenugreek at 3 g/kg of the diet. 3) Control diets supplied with parsley at 3 g/kg of the diet. 4) Control diets supplied with Basil at 3 g/kg of the diet. Chicks fed basil diets had significantly ($p<0.05$) heaviest body weight than those fed the control and fenugreek diets. Carcass characteristics had no significant differences. Significant reduction occurred in serum cholesterol as compared to control diets. It would suggested that the supplementation of broiler chicks diets with (3 g/kg) basil or parsley seeds improved productive performance.

Key words: Fenugreek, parsley, basil, feed additives, broiler performance

INTRODUCTION

Feed additive are important materials that can improve the efficiency of feed utilization and animal performance. The possibility of using new natural alternative additives instead of antibiotics and hormone in animal diets is being recently used. Some plants, containing various essential oils, have been used as alternative remedies by some researchers (Ceylan *et al*., 2003). Some studies have indicated that various plants extracts can improve feed conversion ratio, increase carcass quality, decrease the market age of broiler and reduced their rearing cost (Javed *et al*., 2009). Fenugreek (*Trigonella Foenum-Graecum* L.), like other legumes, is a good source of dietary protein (approximately 20-30%) for consumption by human and animals, the fatty acids from 5-10% which are predominantly linoleic, linolenic, oleic and palmatic acids. It had 45-65% total carbohydrates with 15% of galactomannan (a soluble fiber) (Schryver, 2002). Fenugreek leaves and seeds have been used extensively to prepare extracts and powders for medicinal uses (Basch *et al*., 2003). It's reported to have anti-diabetic, anti-fertility, anti-cancer, anti-microbial, anti-parasitic, hypo-cholesterolaemic effects (Al-Habori and Roman, 2002). Also it contains many minerals and vitamins (Michael and Kumawat, 2003). Parsley (*Petroselium sativam* L.) is mostly cultivated as annual culinary herb and is widely grown in Europe and Western Asia (Peter, 2004). Parsley seed contains 2-8% essential oil with alpha-pinene, apiol, myristicin and tetramethoxyallybenzene as the major constituents. It also contains 13-22% fixed oil consisting mainly of petroselinic acid and smaller amounts of linoleic, myristic, myristolic, oleic, palmatic and stearic and 7-octadecenoic acids (Leung, 1980). The leaves, roots, and seeds are diuretic, reduce the release of histamines and scavenge skin aging free radicals. Also parsley improves their health and scent (Richmond and Mackley, 2000). Parsley is rich in such minerals as calcium, potassium, iron and vitamins such as A, C, thiamin, riboflavin and niacin (Review of Natural Products, 1991) and rich in ascorbic acid and hence is a good blood cleanser. It increases the secretion and discharge of urine and relieves flatulence. Bruised parsley seeds used to be given against plague and intermittent fevers, while the external application of the leaves may help to dispel tumors. It has carminative, tonic and aperients action, a strong decoction of the root being of great service in gravel, stone, kidney congestion, jaundice and dropsy (Duke *et al*., 2009). Basil (*Ocimum basilicum* L.) known as Sweet and Garden Basil, is commonly cultivated throughout Mediterranean region (Ganasoundari *et al*., 1997). Basil seeds are used as diuretic, antipyretic, antispasmodic and stomachic (Ageel *et al*., 1987). Several investigators reported that using Medicinal and Aromatic Plants (MAP) in broiler diets improved body weight, body weight gain, feed conversion efficiency and reduce the cost of feed (Azoua, 2001; Tucker, 2002; Alcicek *et al*., 2004; Osman *et al*., 2004; Abdel-Azeem, 2006). Osman *et al*. (2004) reported that relative economical efficiency was improved by increasing the inclusion level of radish or parsley about 33.5% and 22.2% respectively. Therefore, MAP is preferable as feed additives and growth promoters. It was necessary to throw some more light on these plants concerning their effects on broiler performance. So the objective of the present study was

to investigate the impacts of different types of MAP i.e., Fenugreek, Parsley and Basil seeds as natural feed additives on the performance of broiler chicks.

MATERIALS AND METHODS

This study was carried out at the Poultry Research Farm, Animal Resource Department, College of Agriculture, and University of Basra from 18/11/2008 to 30/12/2008. Chemical analyses were performed in the laboratories of the same department according to the procedures outlined by AOAC (1990). A total of 120 day-old broiler chicks were randomly distributed into four groups of 30 chicks each. Each group was fed on the one of the following experimental diets: 1- Control diet (without supplementation). 2- Control diet supplied with Fenugreek seeds at 3 g/kg of the diet. 3- Control diet supplied with parsley seeds at 3 g/kg of the diet. 4- Control diet supplied with Basil seeds at 3 g/kg of the diet. The composition of the basal diet is presented in Table 1.

Birds were given starter diet to 21 d and a finisher diet to 42 d. Each group was fed *ad libitum* its own diet for a period of 42 days. 24 h light was provided per day. Birds received all vaccination required. Chicks were weighted at 21 and 42 days of age, feed consumption and feed conversion efficiency (g feed: g gain) were measured during the experimental period. At the end of the experimental period four chicks (2 males and 2 females) of similar body weight from each treatment group were slaughtered to determine blood parameters, some carcass traits, dressing percentage and total giblets % (gizzard, liver and heart). A chemical compositions of medicinal plants used in the present study (on a dry basis) is shown in Table 2. All data were subjected to an ANOVA procedure of SPSS (2001). Significant treatment means were separated by using the Least Significant Difference (L.S.D.) test (SPSS, 2001).

Table 1: The ingredients and composition of basal diet

Ingredient (%)	Starter diet (1-21) days	Finisher diet (22-42) days
Yellow corn	50	57
Wheat	17	14
Soybean meal (44%)	22	20
Protein concentration (50%)	9.0	7.0
Limestone	0.5	0.5
Vitamin/mineral premix	1.0	1.0
Salt	0.5	0.5
Total	100	100
Calculated composition		
Kcal ME/Kg diet	3023	3057
Crude protein (%)	22.00	20.00
Ether extract (%)	3.41	3.51
Crude fiber (%)	3.03	3.00
Calorie:protein ratio	137.41	152.85
Calcium (%)	1.01	0.83
Phosphorus available (%)	0.49	0.42
Methionine (%)	0.78	0.51
Lysine (%)	1.17	1.05
Methionine + Cystine (%)	0.77	0.71

Table 2: Chemical composition of Fenugreek, parsley and basil seeds

Item	Fenugreek	Parsley	Basil
Moisture (%)	6.74	8.05	4.99
Crude protein (%)	24.13	21.47	13.74
Ether extract (%)	7.07	12.18	4.36
Crude fiber (%)	10.76	14.77	10.51
Ash (%)	3.68	8.94	9.51
Nitrogen-free extract (%)	54.36	42.64	61.88
Organic matter (%)	96.32	91.06	90.49
ME/Kcal */KG	3819.87	3656.39	3542.97

*Calculated according to Carpenter and Clegg (1956) by applying the equation:
ME (Kcal/kg) = (35.3*CP %) + (79.5*EE %) + (40.6*NFE %) +199

RESULTS AND DISCUSSION

Table 3 showed that chicks fed diets supplemented with 3 g/kg basil seeds had the highest values ($p<0.05$) of Live Body Weight (LBW) at 21 and 42 days of age. However, insignificant effect was observed in LBW of birds consuming 3 g/kg fenugreek seeds as compared to control diets at 42 days of age. The improvement in body weight my be due to the presence of fat soluble, unidentified factors and essential fatty acids in medicinal and aromatic plants (Murray *et al*., 1991), or due to stimulating effect on the digestive system of broilers (Hernandez *et al*., 2004). Such improvement may be due to the antispasmodic and carminative properties of parsley (Osma and Abd El-Wahab, 2009) antipyretic, antispasmodic , stomachic antioxidant and antimicrobial activities of basil (Ageel *et al*., 1987; Seung-Jool *et al*., 2005; Hussain *et al*., 2008). Moreover, the essential oils in basil herb has also been found to have anti-infective function by inhibiting many pathogenic bacteria like *Staphylococcus, Enterococci, Shigella* and *pseudomonas* (www.nutrition -and- you.com).

These finding were disagreement with those of Azoua (2001) who noted that adding fenugreek to broiler diet resulted in increased body weight.

Also Table 3 indicated that feeding different type of Medicinal and Aromatic Plants (MAP) supplementation significantly ($p<0.05$) affected Feed Intake (FI) value during the experimental period. Broiler fed basil, Parsley and fenugreek seeds had the lower feed intake value during 42 days of age while there are insignificant differences appeared when chicks fed fenugreek seeds during 21 days as compared with control groups. The improvement in feed intake with the addition of MAP could be due to essential oils and their main component which stimulated the appetizing and digestive process in animals (Cabuk *et al*., 2003). Abaza (2007) indicated that the level (0.5%) fenugreek seeds caused significant decrease in feed consumption and improved the feed conversion of laying hens.

Data presented in Table 3 showed that Medicinal and Aromatic Plants (MAP) significantly ($p<0.05$) affected

Table 3: Feed intake, body weight and feed conversion ratio in 21 and 42 days of age (mean±se)

	21 days of age			42 days of age		
Treatments	FI (g)	LBW (g)	FCR (g/g)	FI (g)	LBW (g)	FCR (g/g)
Control (0)	608^{b}±30.02	389^{b}±11.64	1.79^{b}±0.028	3387^{a}±11.86	1580^{c}±43.00	2.24^{c}±0.052
Fenugreek (3 g/kg)	568^{b}±6.34	359^{c}±6.09	1.78^{b}±0.045	3212^{b}±7.78	1599^{bc}±18.47	2.06^{b}±0.049
Parsley (3 g/kg)	662^{a}±7.56	404^{ab}±8.19	1.82^{b}±0.042	3071^{c}±9.55	1671^{ab}±12.73	1.88^{a}±0.050
Basil (3 g/kg)	631^{a}±5.57	420^{a}±9.57	1.66^{a}±0.010	3056^{c}±5.79	1712^{a}±17.80	1.83^{a}±0.050

FI, Feed Intake; LBW, Live Body Weight; FCR, Feed Conversion Ratio; means in the same colum with no common superscript are different significantly ($p<0.05$)

Table 4: Carcass characteristic at 42 days of age of chicks received Fenugreek, parsley and basil diets (mean±se)

	Treatment				
Characteristic	Control 0	Fenugreek (3 g/kg)	Parsley (3 g/kg)	Basil (3 g/kg)	Significance
Dressing percentage with out giblets	67.80±1.02	67.56±0.25	67.57±0.56	67.95±0.33	NS
Liver weight (%)	3.51±0.22	3.23±0.28	3.73±0.25	3.57±0.29	NS
Gizzard weight (%)	1.68±0.078	1.76±0.124	1.74±0.066	1.80±0.177	NS
Heart weight (%)	0.69±0.092	0.70±0.072	0.73±0.071	0.75±0.102	NS
Total Giblets (%)	5.88±0.38	5.60±0.32	6.20±0.29	6.13±0.21	NS
Total Edible (%)	73.68±0.76	73.25±0.13	73.77±0.36	74.08±0.28	NS
Spleen weight (%)	0.20±0.06	0.19±0.07	0.20±0.02	0.19±0.05	NS
Pancreas weight (%)	0.21±0.03	0.24±0.12	0.27±0.01	0.29±0.02	NS
Intestine weight (%)	4.47±0.19	6.33±1.05	5.14±0.15	5.44±0.44	NS
Cecum Weight (g)	16.57±1.56	15.83±0.62	19.00±0.58	16.83±0.83	NS
Bursa of fabricius weight (%)	0.14±0.027	0.11±0.018	0.08±0.015	0.08±0.013	NS
Intestine Length (cm)	169.33±4.81	167.00±11.55	170.33±5.18	188.12±6.67	NS
Cecum Length (cm)	18.66±1.20	17.67±0.33	19.00±0.58	19.67±0.88	NS
Carcass length (cm)	26.00±0.66	26.33±0.33	26.33 ±0.33	27.00±0.57	NS

Table 5: Some blood characteristic at 42 days of age of chick fed Fenugreek, parsley and basil seeds (mean±se)

	Treatment				
Parameters	Control 0	Fenugreek (3 g/kg)	Parsley (3 g/kg)	Basil (3 g/kg)	Significance
Total protein (g dl^{-1})	3.46±0.199	4.17±0.150	4.08±0.167	3.42±0.364	NS
Albumin (g dl^{-1})	1.23±0.053	1.51±0.062	1.30±0.143	1.39±0.091	NS
Globulin (g dl^{-1})	2.57±0.240	2.66±0.139	2.78±0.059	2.02±0.373	NS
Albumin/Globulin ratio	0.51±0.093	0.58±0.086	0.52±0.071	0.52±0.047	NS
Cholesterol (mg dl^{-1})	183^{a}±4.38	149^{b}±4.67	152^{b}±10.51	140^{b}±14.02	0.05
Glucose (mg dl^{-1})	135.37±0.81	132.67±2.61	134.66±1.77	137.00±1.53	NS

*Value in the same raw with different superscripts are significantly different

Feed Conversion Ratio (FCR) during 21 and 42 days of age. There was no significant difference in FCR showed between fenugreek, parsley and control groups at 21 days of age. While chicks fed the diets supplemented with basil at levels 3 g/kg had the best FCR value at the two ages as compared to control groups.

These results agree with the finding of El-Gendi *et al.* (1994) who indicated that there was an improvement in feed conversion with feeding herbal products as feed additives that could be attributed to their effect on improving the digestibility of dietary protein in the small intestine.

Results presented in Table 4 indicated that feeding 3 g/kg of fenugreek, parsley and basil seeds insignificantly affected all slaughters parameters. Those results agree with finding of Abaza (2001) and Guo *et al.* (2004) who reported that addition of MAP had no effects on carcass traits. Moreover, Azoua (2001); El-Husseiny *et al.* (2002) and Hassan *et al.* (2004) found that addition of MAP had significantly higher dressing percent in broiler than those fed control diets.

Data of serum constituents analysis are summarized in Table 5. The results of serum constituents indicated that feeding fenugreek, parsley and basil seeds were not significantly affected to total protein, albumin, globulin, albumin/globulin ratio and glucose contents, but serum cholesterol was significantly effected ($p<0.05$) by adding these materials.

These results were in agreement with report of Al-Habori *et al.* (1998) on rabbits who found that plasma cholesterol was significantly reduced in fenugreek groups. Moreover, Sowmya and Rajyalakshmi (1999) found that the germinated fenugreek seeds (12.5 and 18 g/day for 1 month) significantly reduced total cholesterol levels in human. Abdel-Rasoul and Yousif (2003) showed that fenugreek seed powder as capsules (750 mg/kg body weight) decreased blood cholesterol in broiler chickens. Similar results were observed by El-Ghamry *et al.* (2002) with Muscovi duckling who demonstrated that total cholesterol value in plasma of Fenugreek seeds (1.5%) treatments were significantly lower than those of the control group. In conclusion it is

summarized of broiler diets with 3 g/kg of basil or parsley seeds was improve Feed intake, live body weight, feed efficiency and lowering blood serum cholesterol. More research is necessary to characterize the medicinal and aromatic plants with regard to their digestibility, amino acid profile and content of anti-nutritional factor.

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