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Efficacy of *Foeniculum vulgare* seeds powder on growth performance in broilers

Saleh Lemrabt[1], Ram Pal Singh[2], Sasya Nagar[3]
[1] Ph.D Scholar, Department of Biological Sciences, SHUATS, Allahabad, Uttar Pardesh, India
[2] Assistant Professor, Department of Animal Husbandry and Dairying, SHUATS, Allahabad, Uttar Pardesh, India
[3] Assistant Professor, Department of Biological Sciences, SHUATS, Allahabad, Uttar Pardesh, India

Abstract
An experiment was conducted at the Department of Animal Husbandry and Dairying, Sam Higginbottom University of Agriculture, Technology & Science, Allahabad, India, during year 2017 on Efficacy of *Foeniculum vulgare* seeds powder on growth performance in broilers. The experiment was laid out in Randomized Block Design (RBD). There were four treatments like T0, T1, T2 & T3 and 28 chicks in each treatment were distributed. Chicks of each treatment with variable proportions of (T0: (control) basal diet with no supplement, T1: *Foeniculum vulgare* seeds powder 250 gm+50 kg basal diet, T2: *Foeniculum vulgare* seeds powder 500 gm+50 kg basal diet and T3: *Foeniculum vulgare* seeds powder 750 gm+50 kg basal diet). In the view of present investigation, the most effective combined supplements of T_3(*Foeniculum vulgare* seeds powder 750 gm+50 kg basal diet) has proved best in respect of growth performance like body weight and gain in weight, followed by T2, T1 and T0. These formulations improved growth performance in birds. It was concluded that *Foeniculum vulgare* seeds powder has positive effects on broilers.

Keywords: *Foeniculum vulgare* seeds powder, body weight and gain in weight

1. Introduction
In the last few years the poultry industry, as a consequence chicken meat represents 80 percent of the whole production of meat originating from birds still, meat production is the fastest growing component in the meat industry. According to analysis, production, as well as consumption of chicken meat, will rise because of good feed conversion in comparison to other animal species.

Poultry meat is healthy (low fat and high protein content), has good sensory qualities, low price and fast production which mean a short generative time. Poultry diseases represent a significant restraint to the efficiency of production and hence profitability. From a global perspective basically, the same range of poultry pathogens are responsible for losses in livability, egg production, growth rate and feed efficiency worldwide (Shane, 2004) [8].

A poultry farmer who wants top performance from his/her broilers flock must satisfy the birds requirement through a carefully controlled management programmer which includes proper housing, lighting, nutrition, disease control and egg handling (Goodell,1981) [7]. Today broiler production occupies the place of pride in poultry industry. The growth and development of the commercial broiler farming in the country during the last decades has been spectacular.

Scientific production and management have made considerable progress to make broiler farming the fastest growing industry of Indian agriculture. Aromatic plants are becoming more important due to their antimicrobial activity. They possess biological activities such as that of antioxidants, as hypocholesterolemic, the stimulant effect on animals' digestive systems, to increase production of digestive enzymes and improve utilization of digestive products through enhanced liver functions. In limited research, the addition of aromatic plants to the feeds and water improved feed intakes, feed conversion ratio and carcass yield stated that fennel *(Foeniculum vulgare* L.) is one of these aromatic plants which is containing a high percentage of the fatty acids linoleic and stearic.

In addition, fennel has 16.81% Trans - anethole pulse 47.20% estragole with total sweeting components of 64.01% in essential oil.

Indicated that body weight was increased and improved feed conversion by using fennel in the diets. (Abdullah and Rabia (2009) [2].

Fennel seeds usually contain between 26% of essential oil with trans-anethole as the main compound. In a study of the response of growing Japanese quail to meals enriched with different levels of fennel seeds (0.25, 0.50 and 0.75 g/kg), it was concluded that live body weight gain of quail chicks significantly increased. Feed diet containing 0.50 g/kg fennel seed recorded the best values of feed conversion ratio, net return as well as the highest value of economic efficacy among the experimental treatments. The addition of fennel seeds to the basal diet (0.5%) and the mixture of fenugreek and fennel (0.25% + 0.25%) can improve performance and health conditions in broiler chicks. Treatments containing medical plants showed better performance and lower total number of bacteria compared with the control. The weight and length of small intestine and carcass yield in birds fed with medicinal plants were higher than in the control. Significant improvement in final body weight and feed efficiency were recorder when broiler chickens were fed with a fennel added

diet. In addition, chicks feed with fennel had a significantly higher number of red blood cells, hemoglobin and packed cell volume (Acimovic *et al*., 2016) [3].

2. Material and Methods

The experiment was carried out at poultry farm at Department of Animal Husbandry and Dairying Sam Higginbottom University of Agriculture, Technology &Science, Allahabad, India, during year 2017. The experimental technical programmer with one hundred twelve (112) day old broiler chicks of the same day hatch was procured at Broiler Production Unit. The chicks were weighed, put mark to determine each chick and distributed in to 4 groups of 28 chicks in each treatment. Chicks of each treatment were further divided into 16 subgroups of 7 chicks in each. Chicks of each sub group were housed comfortably by providing space 1 sq ft per bird. All the chamber, feeders, water troughs and other equipment were properly cleaned, disinfected and sterilized before using them. The data on various parameters viz, body weight of day-old chicks, weekly body weight, gain in weight, weekly feed consumption and feed efficiency were recorded week and ANOVA for the same was calculated by using RBD.

Experimental design

A total of 112-day old broiler chicks of same hatch was procured and were randomly divided into 7 groups as per following dietary regimens:

T0) (control) basal diet with no supplement.
T1) *Foeniculum vulgare* seeds powder 250 gm+50 kg diet.
T2) *Foeniculum vulgare* seeds powder 500 gm+50 kg diet.
T3) *Foeniculum vulgare* seeds powder 750 gm+50 kg diet.

Table 1: Ingredients and nutrient composition of experimental diet

Ingredients (%)	Starter (1-21d)	Finisher (22-35d)
Corn	54.789	63.765
Soybean Meal	38.733	30.51
Oil-Vegetables	1.313	1.649
DL-Methionine	0.26	0.204
L-Lysine. HCl	0.152	0.16
L-Threonine	0.037	0.028
Choline Chloride	0.074	0
Di Ca- Phosphate	2.247	1.662
CaCO3	1.267	0.904
Na-Bicarbonate	0.244	0.222
NaCl	0.183	0.196
Vit. & Mineral Mixture	0.6	0.6
Filler	0.1	0.1

Vitamin A: 3,600,000 IU/kg; Vitamin D3: : 800,000 IU/kg; Vitamin E: 7,200IU/kg; Vitamin K3: 800 mg/kg; Vitamin B1: 720 mg/kg; VitaminB2: 2,640 mg/kg; Vitamin B3 (Calcium Pantothenate): 4,000 mg/kg; Vitamin B5 (Niacin): 12,000 mg/kg; Vitamin B6: 1,200 mg/kg; Vitamin B9(Folic acid): 400 mg/kg; Vitamin B12: 6 mg/kg; Vitamin H2 (Biotin): 40 mg/kg; Choline: 100,000 mg/kg; Antioxidant: 40,000 mg/kg and 1mg/kg Excipient; Mn: 39,680 mg/kg; Fe: 20,000 mg/kg; Zn: 33,880 mg/kg; Cu: 4,000 mg/kg; I: 400 mg/kg; Se: 80 mg/kg; Choline: 100,000 mg/kg and 1 mg/kg Excipient. (H.R. Gharehsheikhlou *et al*., 2018) [10].

Table 2: Nutritional value per 100 g. of fennel seeds

Principle	Nutrient Value	Percentage of RDA
Energy	345 Kcal	17%
Carbohydrates	52.29 g	40%
Protein	15.80 g	28%
Total Fat	14.87 g	48%
Cholesterol	0 mg	0%
Dietary Fiber	39.8 g	104%
Vitamins		
Niacin	6.050 mg	37%
Pyridoxine	0.470 mg	36%
Riboflavin	0.353 mg	28%
Thiamin	0.408 mg	34%
Vitamin A	135 IU	4.5%
Vitamin C	21 mg	35%
Electrolytes		
Sodium	88 mg	6%
Potassium	1694 mg	36%
Minerals		
Calcium	1196 mg	120%
Copper	1.067 mg	118%
Iron	18.54 mg	232%
Magnesium	385 mg	96%
Manganese	6.533 mg	284%
Phosphorus	487 mg	70%
Zinc	3.70 mg	33.5%

Table 3: Nutrient % for broiler starter

Nutrient Analysis	T0	T1	T2	T3
Dry Matter (%)	89.212	89.462	89.712	89.962
Energy-ME (kcal/kg)	2800	3662.5	4525	5387.5
Crude Protein (%)	21.809	61.31	100.81	140.31
Calcium (%)	1.05	4.04	7.03	10.02
Available. Phosphorus (%)	0.5	1.71	2.93	4.15
Na (%)	0.156	0.37	0.596	0.82
Lysine-TFD (%)	1.15	1.15	1.15	1.15
Methionine-TFD (%)	0.541	0.541	0.541	0.541
Methionine+Cysteine-TFD (%)	0.826	0.826	0.826	0.826
Threonine-TFD (%)	0.748	0.748	0.748	0.748
Tryptophane-TFD (%)	0.223	0.223	0.223	0.223
Arginine-TFD (%)	1.294	1.294	1.294	1.294

Table 4: Nutrient % for broiler finisher

Nutrient Analysis	T0	T1	T2	T3
Dry Matter (%)	88.964	89.214	89.464	89.714
Energy-ME (kcal/kg)	2935	3797.5	4660	5522.5
Crude Protein (%)	18.194	57.694	97.194	136.694
Calcium (%)	0.776	3.766	6.756	9.746
Available. Phosphorus (%)	0.338	1.555	2.773	3.990
Na (%)	0.155	0.37	0.595	0.815
Lysine-TFD (%)	0.976	0.976	0.976	0.976
Methionine-TFD (%)	0.455	0.455	0.455	0.455
Methionine+Cysteine-TFD (%)	0.71	0.71	0.71	0.71
Threonine-TFD (%)	0.635	0.635	0.635	0.635
Tryptophane-TFD (%)	0.185	0.185	0.185	0.185
Arginine-TFD (%)	1.087	1.087	1.087	1.087

3. Results and Discussion

Body weight (g)

The data regarding body weight of the chicks randomly distributed into control (T_0) and three different treatments (T_1, T_2, and T_3) are presented in the Tables 5. From the perusal of data on weekly body weight of broilers, it may be noted that body weight of broilers, irrespective of treatments at one, two, three, four and five weeks of age was 138.20, 387.21, 659.58, 1120.96 and 1599.73 g, respectively. And the differences in these were significant, indicating thereby a significant effect of age on the body weight of broilers in all treatments. The results were expected, because under normal condition the increase of body weight with the intake of feed is what one would expect with the increase in age of birds. When treatments –wise body weight of broilers was recorded at g was found highest in T_3(679.37), followed by T_2 (649.35), T_1(646.51) and T_0(628.56). The differences in these values of treatments were found significant, indicating thereby a significant effect of treatments on body weight of broilers. Results showed that supplementation of Foeniculum *vulgare* seeds powder 750 gm+50 kg diet in ration caused significant increase in body weight. Similar findings with respect to improvement in body weight gain was observed by earlier researchers [Tollba, A.A.H., 2003; Alcicek, A., M. Bozkurt and M. Cabuk, 2003 and Abdul-Azez, N.H., 2000] [9, 5, 1].

Table 5: Average weekly mean body weight of broiler chicks (g) in different treatments.

Treatments	W1	W2	W3	W4	W5	Mean
T_0	134.57	374.71	652.89	1074.18	1535.00	628.56
T_1	132.47	377.36	638.57	1115.36	1615.29	646.51
T_2	142.36	394.29	658.54	1129.18	1571.75	649.35
T_3	143.39	402.50	688.32	1165.11	1676.89	679.37
Mean	138.20	387.21	659.58	1120.96	1599.73	

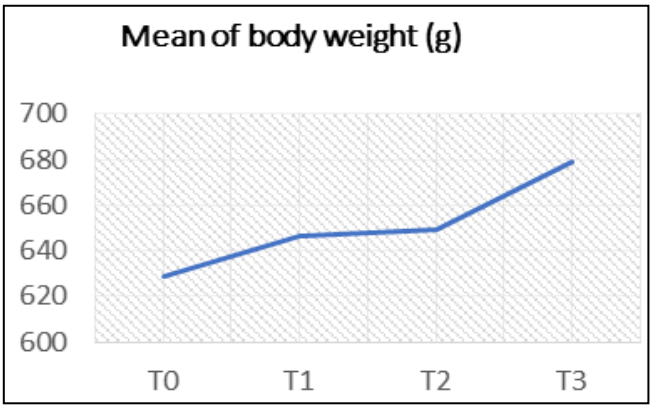

Fig 1

Gain in weight (g)

The data regarding gain weight of the chicks randomly distributed into control (T_0) and three different treatments (T_1, T_2, and T_3) are presented in the Table 6. From the perusal of data on weekly gain in weight of chicks per broiler, contained in Table 6, it may be noted that gain in weight per broiler, irrespective of treatments at first, second, third, fourth and fifth week of age was 89.12, 249.02, 272.37, 461.37 and 478.78, respectively, and the differences in these were significant, indicating thereby significant effect of age on the gain in weight of broilers in all treatments the results were expected, because under normal phenomenon. With increase of age, feed intake was also increased. When treatments were feed intake was recorded, the highest gain in weight was observed in T_3(325.59), followed by T_2(313.48), T_1(304.41) and T_0(297.04). Similar findings with respect to improvement in body weight gain was observed by earlier researchers [Tollba, A.A.H., 2003; Alcicek, A., M. Bozkurt and M. Cabuk, 2003 and Abdul-Azez, N.H., 2000] [9, 5, 1].

Table 6: Average weekly means gain in weight (g) per broiler of different treatments.

Treatments	W1	W2	W3	W4	W5	Mean
T_0	84.79	240.14	278.18	421.29	460.82	297.04
T_1	92.68	251.93	264.25	470.65	442.57	304.41
T_2	84.57	244.90	261.21	476.79	499.93	313.48
T_3	94.43	259.11	285.82	476.78	511.79	325.59
Mean	89.12	249.02	272.37	461.37	478.78	

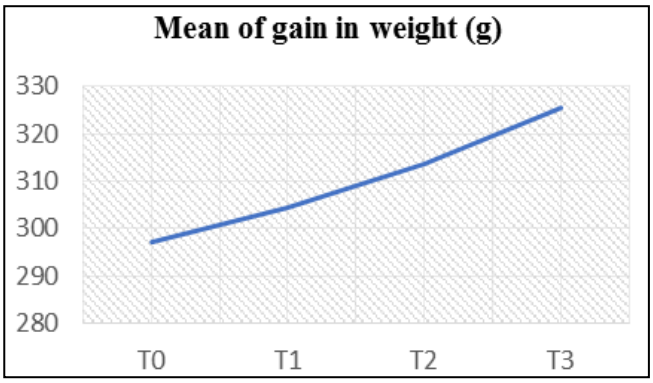

Fig 2

4. References

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