

Effect of Adding Different Levels Seed Cake of *Pimpinella anisum* to Antibiotics-Free Diets of Broilers on Growth Performance and Characteristics of Lymphoid Organ

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Abstract—The aim of the present investigation was to examine the inclusion of the seed cake of the herb *Pimpinella anisum* as feed additive in diets of broilers on feed intake, feed conversion ratio, growth performance and characteristics of lymphoid organ. In this trial 300 one-day-old broiler chicks (Ross 308) were weighted and randomly assigned to the 5 treatment groups, each with 4 replicates with 15 broilers. The broilers were received 0, 0.1, 0.5, 1 PA or 4.5 mg/kg flavofosfolipol antibiotic growth promoter for a period of 6 weeks. In total part of trial Statistical analysis of data on ADG revealed significant difference among the treatment groups due to dietary inclusion of 0.1% PA ($P < 0.05$). No difference ($p > 0.05$) in the mean ADFI was recorded. In during total of trial 0.1 % PA group was the best in terms of FCR index significantly ($p > 0.05$). Birds fed the 0.1% PA seed presented significantly heavier Bursa compared to control group ($P < 0.05$). It can be concluded, that *Pimpinella anisum* as a feed additive for broilers is beneficial for growth performance and immunity that it is suitable to replace an antibiotic feed additive.

Keywords- *Pimpinella anisum*, Broiler, Performance, Flavofosfolipol, lymphoid organ

I. INTRODUCTION

Poultry industry is one of the most dynamic branches of world agribusiness trade. Antibiotics are frequently used for the treatment and control of diseases and even as growth promoters to improve poultry performance. Addition of certain antibiotics fed at low levels for an extended period of time is a common practice in the poultry industry and provides economic benefits by increasing weight gain and improving feed efficiency from 1 to 5% [1]. Recently, published data indicated that indiscriminate use of in-feed antibiotics increases several strains resistance to antibiotics used for human health and enhances transferring the resistance to other bacteria [2]. In fact, it has been reported to phase out these antibiotics from the European Union market since January 2006. Nowadays, the possibility of using new natural alternative additives instead of antibiotics in poultry diets being researched. Phytogetic feed additives

used in poultry feeding to improve performance of poultry. *Pimpinella anisum* (PA) is an annual herb,

indigenous to Iran, India, Turkey and Pakistan. PA seed contains eugenol, methylchavicol, anisaldehyde and estragole. PA seed has been used as an anthelmintic, antifungal, antipyretic and analgesic [3]. Moreover, the plant and especially its fruit oil, has been used for treatment of some of the diseases like rhinitis, cough and other symptoms of the common cold [4]. Based on these ideas a study was planned to elucidate the potential of PA seed as growth promoter and immune stimulator in broiler chicks.

II. MATERIALS AND METHODS

The seeds were added to experimental diets of broilers after carefully grinding. 300 one-day old chicks were divided into

5 groups. Each group consisting of 60 chicks was designated as group A, B, C, D and E. Each group was divided into 4 replicates. Chicks in group A were fed basal diet, while group B, C, D and E were fed basal diet supplemented with 4.5 mg flavofosfolipol/kg diet, 0.1, 0.5 and 1% PA seed cake during six weeks experimental period respectively. The ingredient and nutrient composition of the experimental broiler starter, grower and finisher diet are presented in Table 1. The diets were formulated to meet the requirements of broilers as recommended by the Catalog Ross (2007). Birds were allowed to free access to feed and water during the 42-d growout period. The lighting cycle was 23 h/d maintained. The ambient temperature in experimental house was maintained at 32°C during the first week and gradually decreased by 3°C in the second and third week, and fixed at 22°C thereafter. Each 14 days average daily feed intake (ADFI), average daily gain (ADG) and feed conversion ratio (FCR) for each group was determined. At the end of the study, 2 male birds from each pen were selected, based on the average weight of the group and sacrificed. After sacrificing, the Bursa and spleen was removed from each individual bird, weighted and as a percentage of live weight was calculated. Data were subjected to one-way analysis of variance using SAS statistical package (version 6.08 1989). Significant effect of dietary treatments were compared with Duncan. Values with different superscript differ significantly ($p < 0.05$) between treatments.

TABLE 1. THE INGREDIENT AND CHEMICAL COMPOSITION OF BASAL STARTER, GROWER AND FINISHER DIETS

Ingredients (g/kg)	Starter	Grower	Finisher
Corn	537.3	533	561.5
Soybean meal	400	396	370
Oil	20	35	35
DCP	19.3	17.1	15.6
Caco ₃	10.5	8.7	8.5
NaCl	3.5	3	3
Mineral-Premix ¹	2.5	2.5	2.5
Vitamin-Premix ²	2.5	2.5	2.5
DL-Methionine	3.1	2	1.4
L-Lysine	1.3	-	-
Calculated composition (mg/kg)			
MEnergy (kcal/kg)	2870	2980	3000
Crude protein	22.16	22	21
Calcium	0.86	0.751	0.7
Av.phosphorus	0.495	0.446	0.414
Methionine	1.012	0.89	0.8
Lysine	1.339	1.193	1.13

1-To provide the following per kg of diet: Vit A, 10,000 IU, vitamin D3, 2000 IU, vitamin E 5 IU, vitamin K 2mg, riboflavin 4.20mg; vitamin B12 0.01mg; pantothenic acid 5mg; nicotinic acid 20mg; folic acid, 0.5mg.
 2-To provide the following per kg of diet: choline 3mg; Mg 56mg; Fe, 20mg; Cu, 10mg; Zn 50mg; Co 125mg; Iodine 0.8mg.

III. RESULT AND DISCUSSION

The results of growth performance in broilers are presented in the Table 2. The ADG obtained in birds fed diet containing 0.1% PA was higher than other groups but in starter period not significantly. The highest ADG obtained in birds fed diet containing flavofosfolipol in grower period but not significantly. In total part of trial Statistical analysis of data on ADG revealed significant difference among the treatment groups due to dietary inclusion of 0.1% PA (P<0.05). No difference (p>0.05) in the mean ADFI was recorded. Findings of the research study are also in agreement to Mehmet et al, who reported no difference in the mean feed intake of treated and control groups, given different levels of PA seed and antibiotics [5]. The best FCR in grower period obtained in broilers fed diet 0.1% PA followed broilers fed control diet (p<0.05). In during total of trial 0.1 % PA group was the best in terms of FCR index

significantly (p>0.05). PA seed possesses strong antimicrobial and antibiotic like properties and therefore could be effectively utilized as potential alternative growth promoter [6].

TABLE 2. PERFORMANCE OF BROILERS WITH FLAVOFOSFOLIPOL OR PA

	Basal diet ¹	flavofosfolipol ²	PA (0.1%) ³	PA (0.5%) ³	PA (1%) ³	SEM ³
ADG ¹ (g/d) ³						
0-14 days	17.40 ^a	17.87 ^a	17.97 ^a	17.77 ^a	17.81 ^a	0.65
14-28 days	50.63 ^a	52.37 ^a	51.90 ^a	49.20 ^a	50.75 ^a	1.07
28-42 days	18.00 ^a	14.02 ^a	11.40 ^a	13.20 ^a	12.92 ^a	2.23
0-42 days	50.36 ^a	47.92 ^a	50.92 ^a	46.15 ^a	48.52 ^a	0.83
ADFI (g/d)						
0-14 days	25.92 ^a	26.17 ^a	25.75 ^a	25.00 ^a	25.50 ^a	0.87
14-28 days	95.15 ^a	94.27 ^a	89.62 ^a	88.45 ^a	89.91 ^a	1.82
28-42 days	160.15 ^a	159.12 ^a	154.15 ^a	158.12 ^a	154.15 ^a	3.34
0-42 days	91.75 ^a	91.12 ^a	88.87 ^a	88.65 ^a	88.27 ^a	1.83
FCR ² (g/g)						
0-14 days	1.46 ^a	1.45 ^a	1.43 ^a	1.40 ^a	1.42 ^a	0.04
14-28 days	1.88 ^a	1.79 ^a	1.72 ^a	1.82 ^a	1.76 ^a	0.04
28-42 days	2.03 ^a	2.14 ^a	2.00 ^a	2.16 ^a	2.13 ^a	0.08
0-42 days	1.84 ^a	1.92 ^a	1.71 ^a	1.82 ^a	1.81 ^a	0.04 ^a

Mean values followed by the same letters in the column do not differ according to Duncan test.
 1. Average Daily Gain (g per bird per day)..
 2. Average Daily Feed Intake (g per bird per day)..
 3. Feed Conversion Ratio.

TABLE 3. THE EFFECT OF DIETARY INCLUSION OF FEED ADDITIVES ON CHARACTERISTICS LYMPHOID ORGAN OF BROILER CHICKENS

Treatments ¹	Characteristics ²	
	Bursa (%) ²	Spleen (%) ²
Basal diet	0.186 ^a	0.090 ^a
flavofosfolipol	0.210 ^a	0.091 ^a
PA (0.1%)	0.253 ^a	0.101 ^a
PA (0.5%)	0.221 ^a	0.091 ^a
PA (1%)	0.222 ^a	0.222 ^a
SEM	0.017	0.007 ^a

Mean values followed by the same letters in the column do not differ according to Duncan test.
 1. Percentage of live weight.

Table 3 shows relative weight means (as a percentage of live weight at slaughter) of characteristics lymphoid organ as a function of treatments. The highest relative weight means of spleen obtained in broilers fed dietary supplemented with 0.1% PA seed but no significantly. Birds fed the 0.1% PA seed presented significantly heavier Bursa compared to control group (P<0.05), which was the lowest among all treatments. It maybe due to B lymphocyte stimulation in bursa fabricius which increase immunity in broilers. It can be concluded, that Pimpinella anisums as a feed additive for broilers is beneficial for growth performance and immunity that it is suitable to replace an antibiotic feed additive.

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