

Efficiency of *Echinacea purpurea* on Total Antioxidant Activity in Serum of Broiler Chicks

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Abstract. This experiment was conducted to examine the effect of dried aerial part powder of *Echinacea purpurea* (EP) in comparison with an antibiotic (flavofosfolipol) on total antioxidant activity (AOA) in serum of broiler chicks. In this trial 192 one-day-old broiler chicks (Ross 308) were randomly allocated to the 4 treatment groups, each with 4 replicates with 12 broilers. The 4 treatments were as follows: 1. Basal diet (control); 2. Basal diet + antibiotic (4.5 mg flavofosfolipol/kg diet); 3. Basal diet + dried aerial part powder of EP (5 g/kg diet); 4. Basal diet + dried aerial part powder of EP (10 g/kg diet). The contents of Flavonol-o-glycosides as Quercetin was determined by spectrophotometry method, the Flavonol-o-glycosides as Quercetin content of EP was 20 ± 2 mg/100 g dry weight. At 42 day blood sample were taken and analyzed for total antioxidant activity (AOA) of serum blood. Used of 10 g/kg diet EP led to the highest AOA (mmol/lit) compared to other groups. The AOA increased in broilers fed diet containing 5 g EP/kg diet than those control and antibiotic treatments but not significantly. In conclusions the results of this trial showed that, use of 10 g EP/kg diet improved total antioxidant activity in serum of broiler chicks.

Keywords: *Echinacea purpurea*, Antioxidant Activity, Broiler

1. INTRODUCTION

For many years, antibiotics have been used in the poultry industry. However, the misuse or continuous use of antibiotics has led to the emergence of the antibiotic residue and drug-resistance [1]. Today, the non-prescription use of antibiotics in poultry feeds has been eliminated or severely limited in many countries because of the potential risks associated with their use and development of resistant strains of bacteria, mainly in humans. Addition of medicine herb to feed is one of the alternatives to be used as a replacement for antibiotics. There is sufficient evidence to show that potential herbs are effective for enhancement of the immune system and increasing antioxidant activity for poultry. *Echinacea purpurea* L. (EP) is a kind of Asteraceae native perennial grown in North America and normally used to treat trauma and alleviate symptoms of infection and inflammation. The EP have been proven to show good immunoregulation and antiinflammation effects [2]. This trial selects a medicinal plant with high potential to conduct assay on its antioxidant activity, with antioxidant activity assay further broken down to items of preventing oxidation and scavenging free radicals, with a view to finding out antioxidant effect of EP active substances on the appraised items in order to provide references for antibiotics substitution in broiler diet.

2. MATERIALS AND METHODS :

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2.1. Bird, Diets and Management

The dried aerial parts of EP plants were pressed to cobs to provide optimal storage condition. The content of the Flavonol-o- glycosides as Quercetin determined in the Echinacea dried aerial part prior to feeding by spectrophotometry method. The Flavonol-o- glycosides content of dried aerial part of EP was 20 ± 2 mg/100g dry weight. The cobs were added to experimental diets of broilers after carefully grinding.

192 one-day-old broiler chicks (Ross-308) randomly allocated to the 4-treatment group, each with 4 replicates with 12 broiler chickens. Flavofosfolipol and EP were supplemented to no additive added basal diet. The 4 treatments were as follows:

1. Basal diet (control)
2. Basal diet + 4.5 mg flavofosfolipol/kg diet.
3. Basal diet + 5 g EP/kg diet.
4. Basal diet + 10 g EP/kg diet.

The trial comprised three 2-weeks periods. The birds were fed a starter diet from days 1-14, a grower diet from days 14- 28 and finisher from days 28-42 (Table 1). The diets were formulated to meet the requirements of broilers as recommended by the Catalog Ross (2007). Dried aerial parts of EP were added at the expense of saw dust. 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. At 42d of age two broiler from each replicate of treatments were randomly selected blood samples for antioxidant activity of serum (AOA) were taken by puncture of the brachial vein. AOA were measured by the spectrophotometry method.

2.2. PRINCIPLE

A standardised solution of Fe-EDTA complex reacts with hydrogen peroxide by a Fenton type reaction, leading to the formation of hydroxyl radicals. These reactive oxygen species degrade benzoate, resulting in the release of TBARS. Antioxidants from the added sample of broiler serum cause suppression of the production of TBARS. This reaction can be measured spectrophotometrically and the inhibition of colour development defined as the AOA[3].

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)			
M.energy (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
Meth.+cysteine	1.012	0.89	0.8
Lysine	1.339	1.198	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. Statistical analysis

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

3. RESULTS AND DISCUSSION

The results for serum AOA in broilers are presented in the Table 2. Used of 10 g/kg diet EP led to the highest AOA (mmol/lit) compared to other groups. The AOA of serum in broiler chicks increased than those control and antibiotic treatments significantly (p <0.05). The AOA increased in broilers fed diet containing 5 g EP/kg diet than those control and antibiotic treatments but not significantly.

Table2. The effect of dietary inclusion of feed additives on AOA (mmol/lit) of serum in broiler chicks.

Treatments	AOA
Control	0.67 ^c
flavofosfolipol	0.78 ^{bc}
5 g EP/kg diet	0.91 ^{ab}
10 g EP/kg diet	1.12 ^a
SEM	0.051

^{a-c}Mean values followed by the same letters in the column do not differ according to Duncan test

The active ingredients of a medicinal plant are mainly its phenolic compound that is also an important antioxidant[4,5]. The phenolic compounds are generic term for multiple aromatic groups including mainly flavonoids, phenols acid, isoflavonoids and anthocyanins. These ingredients are naturally produced during a plant’s growth metabolic process, the active substances with antioxidant function such as scavenging reactive oxygen species, free radicals or non-free radical reactive oxygen species production from body metabolism [6].In this trial use of 10 g EP/kg diet increased AOA of serum in broiler chicks. In other trial EP extracts exhibite potentiate to capability for oxidation prevention and display antioxidant effect for scavenging free radicals, similar to our result [7].Also, synergistic antioxidative effect of caffeic acid derivatives, alkamides and polysaccharide fractions was demonstrated by measuring their inhibition of *in vitro* Cu (II)-catalyzed oxidation of human low-density lipoprotein (LDL)[8].Hu et al. studied the antioxidant effect of EP and reported that Echinacoside and caffeic acid in EP were potent scavengers of free radicals such as hydroxyl radicals and superoxide [9].In conclusions the results of this trial showed that, use of 10 g EP/kg diet improved total antioxidant activity in serum of broiler chicks.

4. REFERENCES

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