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EFFECT OF *CANNABIS SATIVA* FORTIFIED FEED ON MUSCLE GROWTH AND VISCERAL ORGANS IN BROILER CHICKS

Rifat Ullah Khan[1*], Fazil-e-Raziq Durrani[2], Niela Chand[2], Haseeb Anwar[1], Shabana Naz[3], Farooq Ahmad Farooqi[4] and Muhammad Nauman Manzoor[5]

[1]*Department of Physiology and Pharmacology, University of Agriculture, Faisalabad, Pakistan*
[2]*Department of Poultry Science, NWFP Agricultural University Peshawar, Pakistan*
[3]*Department of Zoology and Fisheries, University of Agriculture, Faisalabad, Pakistan*
[4]*Drug Residue Laboratories, Animal Quarantine Department, Karachi, Pakistan*
[5]*Department of Animal Nutrition, University of Agriculture, Faisalabad, Pakistan*
[*]*Corresponding author: email: rifatullahkhhan@gmail.com; Phone # +0092-03329089294*

ABSTRACT

This paper describes the effect of *Cannabis sativa* seeds on growth performance of muscle and abdominal organs of broiler chicks. Total 160 broiler chicks (one day old) of equal weight were purchased from the local market and were randomly divided into four groups A, B, C and D. Each group having 40 chicks were further distributed into four replicates. Dried crushed seeds of *Cannabis sativa* seeds were added to the feed of group B, C and D at the rate of 5, 10, and 20% of offered feed respectively while group A served as a control. Feed and water were offered *ad libitum.* The studied parameters included weight of breast, thigh, leg, liver, gizzard, intestines, heart and abdominal fat. The experiment lasted for 42 days. Breast and leg weight were significantly higher ($P < 0.05$) in group D. It was also revealed from the data that weight of liver, gizzard, intestines and abdominal fat were significantly higher ($P < 0.05$) in group D, however, heart weight was non significant. It was concluded from these results that *Cannabis sativa* seeds have remarkable impact on weight of muscles and visceral organs in broilers which is always desirable in poultry industry.

Key-words: *Cannabis sativa,* chicks feed,

INTRODUCTION

Feed is a major component, affecting net return from the poultry business, because 80% of the total expenditure in term of cash is spent on feed purchase (Asghar *et al*., 2000; Farooq *et al*., 2001). To ensure more net return and to minimize high expenditure on feed are the main challenges, for which many research strategies have been practiced such as introducing feed supplements and feed additives (Pervez, 1992). In the past the major growth promoters were antibiotics. However the current research is looking for natural alternative to antibiotics because of their residue and subsequent resistance to bacteria (lee *et al*., 2004). At present the scientists are working to improve feed efficiency and growth rate of livestock using useful herbs (Banyapraphatsara, 2007).

Hempseed (*Cannabis sativa* L.) has been used as an excellent source of food, fiber and medicine since the inception of human civilization (Padua *et al*., 1999; Pringle, 1997). From nutritional point of view it contain approximately 25% protein, 31% fat, 34% carbohydrate, in addition to an interesting array of vitamins and minerals (Callaway, 2004; Darshan and Rudolph, 2000; Leizer *et al*., 2000). The gross energy (GE) content of an oil variety of hempseed has been estimated to 22.0 MJ/kg and hempseed proteins are regarded as easily digested (Callaway, 2004). Seed-eating migratory birds are especially attracted to hempseed fields at harvest time. In many countries hempseed has been used as poultry feed.

In most of the regions hempseed are available in markets and is very popular among people as bird feed due to high quality food contents and low cost compared to other grains. In developing countries feed cost is the major factor in rising poultry meat and eggs. The aim of the poultry researchers is to gain high weight of broilers in minimum days with least cost. The meat and visceral organs of broilers are important from the view point of nutrition, digestibility and taste. Therefore a study was conducted to investigate the effect of feed added *Cannabis sativa* on the muscle growth of breast, leg and thigh as well as visceral organs of broiler chicks.

MATERIALS AND METHODS

Experimental Design

The experiment was conducted in completely randomized design (CRD). A total of 160 (one day old) commercial male Ross broiler chicks were procured from the local market and were divided into four groups A, B, C and D. Each group was further divided into four replicates having ten chicks/replicate. The birds were raised on conventional deep litter system, with open sided house. All the pens were located in one house to have identical

environment. Each pen was provided with a feeder and drinkers. The composition of feed provided is given in table I.

Table 1. Ingredients and composition of basal diet (as fed bases)

Ingredients (g/kg of diet)	Starter	Grower	Finisher
Maize, yellow	354.0	329.0	250.0
Soybean meal (480 g CP/Kg)	275.0	205.0	170.0
Sunflower meal 350 g CP/Kg)	110.0	151.0	110.5
Wheat	99.0	130.5	331.0
Wheat bran	-	37.0	-
Meat-bone meal	65.0	55.5	49.5
Vegetable oil	73.9	85.5	73.5
Limestone	13.5	-	-
Mineral-vitamins premix[1]	3.5	3.1	3.5
Sodium chloride	3.1	2.5	2.5
L-lysine	0.4	-	0.1
DL-Methionine	1.6	0.1	1.7
Calculated chemical composition (per Kg of diet)[2]			
ME (MJ)	13.2	13.4	13.4
Crude Protein (g)	231.2	212.0	189.8
Calcium (g)	15.0	9.0	8.0
Available phosphorus (g)	5.0	4.7	3.9
Lysine (g)	12.0	10.0	8.5
Methionine (g)	5.6	4.0	5.2
Methionine + cystine (g)	9.3	7.6	8.4
Sodium chloride (g)	3.4	2.9	2.9

[1]provides per kg of diet: Mn 80 mg; Zn 60 mg; Fe 60 mg; Cu 5 mg; Co 0.2 mg; I 1 mg; Se 0.15 mg; choline chloride 200 mg; vitamin A 12 000 IU; vitamin D3 2 400 IU; vitamin E 50 mg; vitamin K3 4 mg; vitamin B1 3 mg; vitamin B2 6 mg; niacin 25 mg; calcium-d- pantothenate 10 mg; vitamin B6 5 mg; vitamin B12 0.03 mg; d-biotin 0.05 mg; folic acid 1 mg

[2]calculated from NRC values (1994)

Addition of *Cannabis sativa* to feed

The seeds of *Cannabis sativa* were purchased from the local market. After drying the seeds were ground with the help of electric grinding machine and were added to commercial broilers ration @ 0, 5, 10 and 20% for group A, B, C and D, respectively. The experiment lasted for 42 days. At the end of experiment 6 birds from each group were randomly selected and slaughtered with a sharp knife. Feathers and skin were removed. Belly of each bird was opened and abdominal organs including heart, liver, intestines, gizzard and abdominal fat were also removed and weighed with wing balance. Breast, leg and thigh from each bird were also cut and weighed on wing balance.

The data on weight of breast, leg, thigh, heart, liver, intestines, gizzard and abdominal fat was statistically analyzed with standard procedure of variance (ANOVA). Means were compared for significance of differences by least significance differences (LSD) as suggested by Steel and Torrie (1981).

RESULTS

The data regarding breast, thigh and leg is given in Table 2. Breast weight was significantly high ($P< 0.05$) in group D. There was non significant difference in thigh weight between the groups. However, it was highest in group D. Leg weight was significantly high ($P< 0.05$) in group D.

Table 2. Mean ± SE of breast, thigh and leg weight (g) in response to different levels of *Cannabis sativa* added feed

	Groups			
	A	**B**	**C**	**D**
Parameters(g)	**Control**	**5% *C.sativa***	**10% *C.sativa***	**20% *C.sativa***
Breast	357.5 ± 10.22^{b}	357.8 ± 7.55^{b}	$366.0\pm12.^{65ab}$	391.6 ± 11.33^{a}
Thigh	106.1 ± 5.6^{a}	94.2 ± 4.54^{a}	107.3 ± 3.34^{a}	112.1 ± 6.77^{a}
Leg	75.00 ± 6.88^{b}	76.77 ± 5.44^{b}	81.44 ± 5.25^{ab}	85.34 ± 7.32^{a}

Similar alphabets in a row do not differ significantly ($P\leq 0.05$)

The data obtained from the experiment on liver, gizzard, intestines, heart and abdominal fat weight is presented in Table 3. The liver weight data when subjected to analysis of variance showed that it was significantly high ($P< 0.05$) in group D having 20% added *cannabis sativa*. The gizzard weight data when subjected to analysis of variance revealed that it was significantly high ($P< 0.05$) in group D. Likewise, mean abdominal fat weight was significantly high in group D. The mean intestine weight was also significantly high ($P< 0.05$) in group D. Heart weight was non significant ($P> 0.05$).

Table 3. Mean ± SE of liver, gizzard, intestines, heart and abdominal fat weight (g) in response to different levels of *Cannabis sativa* added feed.

	Groups			
	A	**B**	**C**	**D**
Parameters(g)	**Control**	**5% *C.sativa***	**10% *C.sativa***	**20% *C.sativa***
Liver	49.8± 1.78^{b}	47.7±1.77^{b}	50.9±1.98^{ab}	54.5±1.72^{a}
Gizzard	34.4±2.12^{ab}	35.6±1.91^{ab}	36.9±3.58^{ab}	52.9±5.74^{a}
Intestines	104.4±3.02^{b}	105.1±1.56^{b}	118.9±1.11^{ab}	130.5±5.68^{a}
Heart	3.6±0.54^{a}	4.3±0.18^{a}	5.2±0.79^{a}	5.5±0.29^{a}
Abdominal fat	305.±2.55^{b}	32.4±1.73^{b}	41.2±8.95^{ab}	36.4±1.49^{a}

Figures followed by similar letters in a row do not differ significantly ($P\leq 0.05$)

DISCUSSION

The positive effect of broilers performance in this experiment indicates the nutritive effect of *cannabis sativa* seeds. This is expected to be the main factor responsible for growth of muscles and visceral organs at the end of experiment. This might be due to rich nutrient content of unsaturated and unsaturated fatty acids, superior quality amino acids and other components like vitamins and minerals. A direct comparison of amino acids profile showed that hempseed protein is comparable to those from egg white and soy in quality (Callaway *et al*, 2004). Sakakibara *et al*., (1991) concluded from his studies that *Cannabis sativa* have purgative effect due to presence of canabisin A. It has been regarded as alternative feed source for poultry in India (Sapcota, 1992). Hampson *et al*., (2000) reported superior antioxidant activity of cannabidiol than α-tocopherol and ascorbate. The fact that trypsin inhibitory substances are absent in hemp protein (Odani and Odani 1998), which partially explain it a superior protein to soy beans.

Hempseed (*Cannabis sativa*) has been shown to alleviate stress (Wheeler *et al*., 1994), improve immunity (Zhu *et al*., 1997), suppress tumerous cell (Guzman, 2003), having antimicrobial (Zhu *et al*., 1997; Novak *et al*., 2001) and antiviral activities (Morhan, 1997). Moreover it has also been reported for antinflammatory, antipyretic, antiparasitic and insecticidal effects (Piao *et al*., 1990; Nok *et al*., 1994; Bishnupada *et al*., 1997). Combinations of these beneficial effects might have resulted in higher weight of studied parameters.

In conclusion, the seed powder of *Cannabis sativa* at the rate of 20% has positive effect on weight of breast, leg, thigh as well as liver, gizzard, intestines and abdominal fat weight.

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