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Research Article

EFFECT OF USE BLACK AND RED PEPPER POWDER AS FEED ADDITIVE ON PERFORMANCE AND SOME IMMUNE PARAMETERS OF COBB 500 BROILER CHICKS

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ABSTRACT
For investigation the effect of use red and black pepper powder on performance of broiler chicks a total 180 one day Cobb 500 broiler chicks were divided into 4 groups of 15 birds each and assigned to 3 treatment diets. Chicks were fed by T1, basal diet as control; T2, basal diet with red pepper powder 200(gr/ton); T3, basal diet with using black pepper 200 (gr/ton). During the experiment feed intake, body weight gains, and feed conversion ratio was calculated. At the end of experiment four chicks form each group were slaughtered for carcass evaluation. Some blood parameters triglyceride, HDL and LDL were determined. Antibody titer against Newcastle vaccine investigation was performed. In addition, Intestinal microbial populations for *E. coli* and lactobacillus (cfu/gr) were investigated. The results showed that body weights and feed to gain ratios were improved significantly ($p<0.05$). Liver percentage was significantly decrease were broilers fed with T_1, but where they used T_2 diet liver percentage significantly increased, ($p<0.05$). There were no significant differences in for drumstick and breast meat percentage in this case. Serum cholesterol, triglyceride, HDL and LDL levels changed with use experimental diets, level of triglyceride was lower when chicks used T_1 diets. In this trial use of black pepper in broilers diet cause to significant decrease blood triglyceride levels but they increased levels of blood cholesterol of broilers chicks significantly ($p<0.05$). Antibody titers were significantly higher when broilers were fed by T_1, T_2 ($p<0.05$). The results suggest that both T_1 and T_2 may reduce intestinal populations of Escherichia coli and increase intestinal populations of lactobacillus compared to the control groups ($p<0.05$). It seems that inclusion of red and black pepper powder at these levels could be useful on performance, some blood biochemical values and immunity parameters on Cobb 500 broiler chicks.

Keywords: *Black Pepper, Blood Parameters, Broiler Chicks, Performance, Red Pepper*

INTRODUCTION
Herbal extracts, spices and mixture as feed additives are natural alternatives to the use of antibiotics in broiler diets (Moorthy, 2009). The effect of a these feed additive on nutrient digestibility has been well illustrated in many studies (Demir, 2003). Feed additives are plant derived products used in poultry feeding to improve the consumption and conversion of food, and the digestibility and weight gain of broiler chickens (Windisch, 2008). Black pepper (*Piper Nigrum L*) is a member of family Piperaceae (Ficker *et al.,* 2003; Moorthy *et al.,* 2009). Efficiency compounds of pepper consist: cupsaeesin, cupsisin and cupsantine that some of them allay rheumatic aches. Piperine (1-piperoyl-piperidine) is a major alkaloid component of black pepper and it is one of compound of black pepper which has antiache effect (Moorthy *et al.,* 2009). In addition, the bioactive molecule, piperine, present in pepper has major pharmacological impacts on the nervous and neuromuscular systems, exercises it can help in digestion (Ferreira *et al.,* 1999; Great Head, 2003). Hot red pepper (Capsicum Annum) is one of the most important herbs, which is widely used in human feed all over the world, its originated from central and South America and its belonged to Solanaceae family, genus Capsicum is belong to the most heavily and frequently consumed as spices throughout the world (Shahverdi *et al.,* 2013). Capsaicin a pungent principle of hot red pepper has been used as spices, feed additives and drugs in hot red pepper are capsaicin. Capsicum is commonly used to buffer pain from other ailments, including arthritis, varicose

veins, headaches, menstrual cramps and respiratory conditions such as asthma. Many researchers proved that an increase in BW and decrease in FCR, when using this herbal plants in broilers diets (Herati and Marjuki, 2002; Ficker *et al.,* 2003; Moorthy *et al.,* 2009). Some studies showed that treatment with red and black pepper conversion efficiency for poultry (Shahverdi *et al.,* 2013, Ghaedi *et al.,* 2014). For as much as red and black pepper powders have a wide range of potential uses, so the objective of this study was to explore the potential use of them as feed additives and growth promoters on performance in Cobb 500 broiler chicks.

MATERIALS AND METHODS

For investigate the effect of using Red and black pepper on performance of broiler chicks a total 180 one day Cobb 500 broilers chicks were divided into 3 groups of 15 birds each and assigned to 4 treatment diets. The experiment was carried out in 6 weeks. Feed and fresh water were providing *ad libitum* during this experiment. Chicks were fed by T1, basal diet as control; T2, basal diet with Red and black pepper powder 200 (gr/ton) each, that they were balanced according to their requirement as shown in NRC for poultry, 1994. The body weight gains; feed consumption and feed conversion efficiency were measured weekly. At the end of trial 2 birds form each treatment were slaughtered and to compare body parts were separated and weighted. blood samples from each bird were collected and stored at refrigerator at +4$^{°C}$ for 24 h, then they were subjected to biochemical determine for their cholesterol, triglycerides, HDL and LDL (Ellefson and Graway,1967; Zlatkis, 1993). Antibody titers against Newcastle vaccine were measured by Hemagglutination inhibition test. In addition by collecting 1gr digesta from illeocecal intestinal microbial population's flora for Escherichia coli and lactobacillus microbial population were investigated. Plate counts were performed for each gastrointestinal tract location that was sampled (Kheiri *et al.,* 2015). Earned data were collected and analyzed by using the general, linear model procedure of SAS (2001) and different means Duncan's multiple ranges test was used to detect the differences at level ($p<0.05$). The data were analyzed according to the following model: $Y_{ij} = \mu + T_i + e_{ij}$. Whereas: Y_{ij} = Average effect observed, μ = Total average, T_i = Effect of treatments, e_{ij} = Effect of errors.

Table 1: Composition of the Experimental Diets (0-6 Weeks)

Ingredients %	**0-02 (Weeks)**	**02-04 (Weeks)**	**04-06 (Weeks)**
Corn grain	51.64	56.61	60.37
Soybean meal	37.74	32.30	27.81
Wheat grain	5	5	5
Vegetable Oil	1.40	2.03	2.84
DCP	1.56	1.47	1.39
Oyster shells	1.17	1.13	1.08
Methionine D-L	0.30	0.29	0.27
Lysine-L	0.13	0.13	0.30
Nacl	0.26	0.24	0.14
Vitamin Premix*	0.3	0.3	0.3
Mineral Premix*	0.3	0.3	0.3
Red /Black pepper powder	0.2	0.2	0.2
Calculated Nutrient Content			
ME(Kcal/Kgr)	2.850	2.950	3.050
CP (%)	22	20	18.5
Ca (%)	0.90	0.85	0.80
Available Phosphorus (%)	0.45	0.42	0.40
Lysine (%)	1.35	1.20	1.16
Na (%)	0.16	0.15	0.15
Methionine+Cystine (%)	0.97	0.87	0.85

Supplied Per Kilogram Of Feed: 7.500 IU of vitamin A, 2000IU vitamin D3, 30 Mg vitamin E,1.5 µg vitamin B12,2Mg B6,5 Mg Vitamin K,5 Mg vitamin B2,1 Mg vitamin B1,40 Mg nicotinic acide,160µg vitamin Biothine,12 Mg Calcium pantothenate,1MgFolic acid 20 Mg Fe,71 Mg Mn,100µg Se,37Mg Zn,6 Mg Cu,1.14 Mg I,400 µg Cu.

RESULTS AND DISCUSSION

Results

Data in (Table 2) showed significant difference about FI in trial groups ($p<0.05$). The lowest feed intake was for control groups and the maximum amount was for the groups that they used red pepper. The highest BW was for $T_1$and T_2 and the lowest FCR was too. Data from this study showed that highest Pre-slaughter weigh was for T_1.

Table 2: The Effect of Added Experimental Diets on Broilers Performance

Treatments	FI(g/d)	BW(g/d)	FCR	FI(kg)	Pre-Slaughter Weigh(g)
Control	87.20^{c}	40.50^{b}	2.16^{a}	3664.0^{c}	1705.1^{b}
T_1	89.24^{a}	43.11^{a}	2.04^{b}	3744.9^{b}	1806.2^{a}
T_2	88.36^{b}	41.35^{a}	2.06^{b}	3710.6^{a}	1732.4^{a}
MSE	0.044	0.065	0.010	0.274	0.410

*Means within row with no common on letter are significantly different ($p<0.05$).

As data revealed from this study we could showed that although liver percentage was significantly decrease were broilers fed with T_1, but also liver percentage significantly increased were chicks fed by T_2 ($p<0.05$).

There were no significant differences in about drumstick and breast meat percentage. As shown in the table 3 using of T_1, T_2 reduced abdominal fat percentage statistically ($p<0.05$). Gizzard percentage was higher in T_2 than other groups.

Data from (Table 3) showed that carcass yield was at the highest in T_2 and it was at the lowest on control ($p<0.05$). Actually Borsal.f percentage was higher in control. Abdominal fat decreased when broilers were fed by red and black pepper powders compared to the control ($p<0.05$).

Table 3: The Effect of Added Experimental Diets on Percentage of Some Visceral Organs

Treatments	Liver (%)	Abdominal Fat (%)	Drumstick (%)	Breast Meat (%)	Gizzard (%)	Borsal.f (%)	Carcass Yield (%)
Control	3.20^{b}	4.40^{a}	21.21^{b}	25.00^{a}	3.40^{b}	0.271^{a}	68.41^{b}
T_1	3.04^{c}	4.00^{b}	23.29^{a}	26.14^{a}	3.69^{a}	0.158^{b}	72.28^{a}
T_2	3.40^{a}	3.71^{c}	22.98^{a}	26.01^{a}	3.28^{b}	0.141^{b}	70.04^{a}
MSE	0.116	0.214	0.174	0.320	0.230	0.117	0.769

*Means within row with no common on letter are significantly different ($p<0.05$).

Data showed the serum cholesterol, triglyceride; HDL and LDL contents were changed by using experimental diets (Table 5).

Triglyceride level was lower when chicks used T_1 diets. Using of black pepper in cause to significant decreasing in blood triglyceride content but increased amount of blood cholesterol of broilers chicks significantly ($p<0.05$).

Blood cholesterol induced when chicks used T_1, T_2 respectively. Data showed that HDL was at lowest when chicks fed by control diet but LDL was higher on control group ($p<0.05$).

Table 4: The Effect of Added Experimental Diets on Some Blood Parameters

Treatments	Triglyceride(Mg/dl)	Cholesterol (Mg/dl)	HDL(Mg/dl)	LDL(Mg/dl)
Control	70.10^{a}	130.15^{a}	58.08^{c}	69.14^{a}
T_1	66.21^{b}	128.02^{b}	60.05^{b}	67.20^{b}
T_2	68.30^{c}	126.14^{c}	63.14^{a}	66.38^{c}
MSE	0.410	0.147	0.632	0.121

*Means within row with no common on letter are significantly different ($p<0.05$).

By measuring antibody titers against new castle vaccine we investigated that it was significantly higher when broilers fed by T_1, T_2 ($p<0.05$). The results suggested that the lactobacillus populations were significantly higher ($p<0.05$) for birds who receiving red and black pepper than in the birds given diets with the other diet and E.coli populations were significantly higher on the control groups ($p<0.05$). The results showed that both T_1 and T_2 may reduce intestinal populations of E.coli and they increase intestinal populations of lactobacillus than control groups ($p<0.05$).

Table 5: The Effect of Experimental Diets on Antibody Titer and Intestinal Microbial Populations

Treatments	$HI_{(log2)}$	E.Coli (cfu/gr)	Lactobacillus(cfu/gr)
Control	3.51^{c}	6.70^{a}	4.74^{b}
T_1	4.22^{b}	5.67^{c}	5.32^{a}
T_2	4.73^{a}	5.32^{b}	5.40^{a}
MSE	0.500	0.098	0.244

*Means within row with no common on letter are significantly different ($p<0.05$).

Discussion

We could noted that red and black pepper inclusion could have some significantly differs ($P<0.05$). This may be due to the digestibility property of black pepper included in the broiler diet, which was similar to the findings of (Ghazalah *et al.*, 2007; Galib *et al.*, 2011; Ghaedi *et al.*, 2014).

Hosseini Mansob (2011) showed that black pepper increases digestion through arousing digestive liquids of stomach and eradication infectious bacteria. Black pepper affects the absorption power, decrease material transit velocity and increase digestive enzymes acts and increased chicks dietary and weighs gain. Galib *et al.*, (2011) noted that according to the level of black pepper used that reflects the high activity of piperazine citrate included in the broilers diet which may have affected the flow of digestive juices across the stomach. Conley (1997) reported that red ginger has characteristic as stimulant for feed digestion and conversion which increase body weight gain. In spite of the low consumption compared with other by the fact that is help herbal plant may provide some compounds that enhance digestion and absorption of some nutrients in these diets. Other researchers proved that there is an increase in BW, FCR with decreasing hematological values of some important blood parameters using of ginger or black pepper in broiler diet (Ferreira *et al.*, 1990). Al-Harthi *et al.*, (2006) who found that broiler chicks fed diets supplemented with hot pepper showed improved feed conversion ratio. It may be due to its stimulant, carminative, digestion and anti microbial properties. The findings of these researchers in this case are in agreement with the others (Al-Kassie *et al.*, 2001; Khalaf *et al.*, 2007; Ghaedi *et al.*, 2014). The pungent compound of piper nigrum especially piperine increases the production of saliva and gastric secretions. Furthermore, the ingestion of pepper increases the production and activation of salivary amylase Yoshikawa *et al.*, (1994). The digestive enzymes production by the ingestion of black pepper probably the stimulate liver to secrete bile, which Furth digests food substances (Ferreira *et al.*, 1999; Herati and Marjuki, 2011). Black pepper has medicinal uses and has been common medicines for various disorders of humans in traditional Indian families (Moorthy *et al.*, 2009). Pipers also prevent the intestine induced oxidative stress, inhibit lipid per oxidation, arresting different radicals such as hydroxyl and super oxides radicals. Weiner (1994) reported that some plants or specific combinations of herbs in formulations may act as antioxidants by exerting superoxide scavenging activity or by increasing superoxide dismutase

activity in various tissue sites. These results proved that and black pepper additives though being less effective- performed like antibiotic to certain extent and have a great potential to be utilized as an alternative. By the fact that active compounds in black pepper having receptors on adrenal gland may affect the nervous system and decrease ACTH secretion that causes stress which may lead to increase blood glucose concentration.

Al-Harthi (2006) who found that feeding chicks red pepper supplemented diet showed an improved feed conversion ratio, its attributed to its stimulant, carminative, digestion and antimicrobial properties. Pepper has been found to have antioxidant properties and anti carcinogenic effect, especially when compared to chili (Nalini *et al.*, 2006). Shahverdi *et al.*, (2013) suggested that red and black pepper controls microbial growth by acting on the mircoflora's biochemical processes in the cell, such as protein synthesis, by inhibiting the elongation of Methono bacterium and Escherichia coli, or by reducing lactic acid producing bacteria by 10 to 20 fold in the stomach. Also Ghaedi *et al.*, (2014) showed that while lactic acid producing bacteria help prevent Photogenes and they also are largely responsible for retarded growth seen in broiler chicks.

Conclusion

It was concluded that some useful and beneficial acts by using red and black pepper powder on growth and some immune and health parameters for Cobb 500 broilers chicks. We could explained that improvement may be due to the biological functions to improve growth or that may be due to its role as stimulant, enhanced digestibility, anti-oxidant, anti-microbial, anti-fungal activities or maybe the prevention of gastric toxicity. However, further studies are needed to more detail explanation.

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