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The Effects of Using Hot Red Pepper as a Diet Supplement on Some Performance Traits in Broiler

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Abstract: This study was carried out to determine the performance of broilers fed diets included hot red pepper (*Capsicum Annum*). A total of 250 (Rose 308) day old chicks were used in this study. Five levels of hot red pepper at the rate of (0.00%, 0.25%, 0.50%, 0.75%) and 1% were incorporated into the basal diet for six weeks. The results revealed that the inclusion of hot red pepper at levels of 0.50%, 0.75% and 1% in the diets improved body weight gain and conversion ratio improved at levels 0.50%, 0.75% and 1%. At the same time the hot red pepper of 0.25%, 0.75% and 1% depressed the cholesterol, Hb, RBC and H/L ratio concentration. It was concluded that use of hot red pepper as feed additive at 0.50%, 0.75% and 1% enhanced the overall performance of broiler chicks.

Key words: Hot red pepper, feed additive, performance, broiler

INTRODUCTION

Hot red pepper (Hrp) 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 (Kobata *et al*., 1998).

Capsicum annum is the 1st introduced world wide which is divided into two categories: sweet (or mild) pepper and hot (or chilli) pepper. *Capsicum annum* is the most spread in term of household consumption and industrial processing (Kodama *et al*., 2008).

Capsinoids is a family of compounds that are analogues of capsaicin, which is the pungent component in hot chilli peppers. Capsinoids are widely present at low levels in chilli pepper fruit, it includes capsiate, dihydrocapsiate and it has a very favorable safety profile (Kobata *et al*., 1998) Capsinoids present in red peppers causes pungent, hot tasting sensations when consumed as a part of the diet in addition to sensory properties that it may be affects human health, capsinoids includes antimicrobial activities against disease caused by bacteria. It exhibited protective effects against mutagens and carcinogens, cholesterol, obesity and pains (Suk-Hyun Choi *et al*., 2006).

Capsaicin (CAP) is the main capsaicinod in chilli peppers. CAP is stable in water and some animal studies indicated that it absorbed into blood stream (Diepvens, 2007).

The role of CAP in carcinogenic processes is quite controversial. Although some investigators suspect that CAP is a carcinogen, co-carcinogen or tumour promoter, where as Young-Joon Surh (2002) have reported that it has a chemopreventive and chemotherapeutic effects. In addition to its action as preferentially repress for the growth of some transformed human and mouse cells (Morre *et al*., 1995).

Capsaicin (CAP, 8-methyl-N-Vanilly-6-nonenamide) is the active substance responsible for the irritating and pungent effects of various species of hot pepper. CAP has emerged as a relatively selective neurotoxin for small-diameter sensory neurons (Jessel *et al*., 1978; Nagy *et al*., 1981; Mitsuhiro *et al*., 1994; Jancso *et al*., 1997).

Capsaicin a pungent principle of hot red pepper, has been used as spices, feed additives and drugs in hot red pepper are capsaicin (Collier *et al*., 1965; Nwaopara *et al*., 2007) carotenoids e.g. capsanthin, capsorubin, carotene (Govindarjan, 1968; Saber, 1982) and steroidal saponins known as capsicidins found in seed and root (Saber, 1982) CAP is the main component of Hrp, including hot taste and is known to active afferent nerve fiber (Holzer, 1991), CAP has been shown to have a protective function in the gastric mucosa as the stimulation of afferent nerve endings by capsaicin protects against aspirin or alcohol-induced gastric injury (Gonzalez *et al*., 1998).

CAP and main capsacinoid are also about twice as potent to taste and nerves as the minor capsaicinoids. Nordihyro capsaicin, hemodihydrocapsaicin and homocapsaicin skin, an alarm the residence of the stomach and to tonic a good digest.

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Hrp is known as the herb crises in order to stimulate the healing effects of the disregarded the body such as kidney, lungs, stomach and heart. The effect of Hrp appetizer on subsequent energy and micronutrient intakes were examined and it showed that Hrp in addition to appetizer significantly reduced the cumulative *ad lib* energy and carbohydrate intake during the rest of the lunch and in the snakes served several hairs later (Yoshioka *et al.*, 1999).

Hrp used as a spices and appetizers if it used in reasonable quantities because it defects the mucous membranes of the intestinal digestive. Hrp is a tonic plant, calming year, keeping the skin, an alarm the residence of the stomach and tonic a good digestion.

Hrp play an important role in increasing the ability analyzer and deposition of cholesterol and fat in the body and contributes to decrease levels of triglycerides and work to support the vascular system in the body (Hencken, 1991) explained that Hrp is rich in vitamin C which have a considerable impact on improving production through attributes the reduction of heat stress on a fact that birds consumption of Hrp induce a considerable change in energy balance when individual are given free access to food (Yoshioka *et al.*, 2001).

All additives improved apparent feed digestibility of dry matter and crude protein of the finisher diet. No differences were observed for proventriculus, gizzard, liver, pancreas and small intestine weight.

Plant extracts improved the digestibility of the feeds for broilers. The effect of different additives on digestibility improved the performance slightly but this effect was not statistically significant (Hernandez *et al.*, 2004).

The main purpose of this study was carried out to evaluate the effect of different dietary levels of Hrp on the performance and some haematological parameters of broiler.

MATERIALS AND METHODS

The experiment was carried out at the poultry farm of Veterinary College, Baghdad University. Three hundred days old broiler (Rose 308) chicks were divided into 5 treatment groups, 60 birds each treatments was further subdivided into 3 replicates, 20 birds each.

The treatments were divided as fallows: Diet (1) using basal diet with no herbal plants kept as control. Diet (2) basal diet plus 0.25% of Hrp (250 gm/100 kg of feed). Diet (3) basal diet plus 0.50% of Hrp (500 gm/100 kg of feed). Diet (4) basal diet plus 0.75% of Hrp (750 gm/100 kg of feed). Diet (5) basal diet plus 1% of Hrp (1000 gm/100 kg of feed).

Chicks were reared in floor pens (1.5 m x 1.5 m) with a thick litter system of wood shavings about 7 cm. The feeding program consisted of starter diet that have been used until 21 days of age and a finisher diet until 42 days of age. All diets of each period were prepared with the same composition. Diets were formulated to meet or excess requirements according to the National Research Council (NRC) (1994) for broilers at this age. The feed and water provided *ad libitum* during the experiment. Two phases of feeding program involved in supplying: starter (1-21 days of age) and finisher (22-42 days of age). The chemical composition of the experimental basal diets are shown in Table 1.

Table 1: Composition of the experimental basal diets

Ingredient (%)	Starter 1-21 day	Finisher 22-42 day
Yellow corn	51.00	53.30
Soybean meal (45% protein)	30.00	25.00
Wheat	13.80	15.00
Oil	1.00	2.50
Premix*	2.50	2.50
Salt	0.30	0.30
Methionine	0.10	0.10
Lysine	0.10	0.10
Di-Calcium phosphate	1.20	1.20
Calculated chemical analysis		
ME (Kcal/kg)	3000.00	3086.00
Crude protein (%)	21.30	19.50
Calcium (%)	0.69	0.52
Available phosphore	0.74	0.69
Methionine	0.33	0.31
Lysine	1.19	1.08

*Premix:- (2.5%) Provided the following (per kg of complete diets) 367500 IU, 133500 IU Vit. D3, 1920 mg Vit. E, 83.42 Vit. K3, 50 mg Vit. B1, 150 Vit B2, 500 mg Vit. B3, 177,5 mg Vit. B6, 0.8 mg Vit B12, 600 mg Vit.PP, 24.5 mg folic acid, 27 mg Biotin, 5767.5 mg choline, 2667 mg Fe, 333.75 mg Cu, 3334.06 mg Mn, 203 mg Co, 2334.38 mg Zn, 100.75 mg Ca, 10 mg Se, 65446.46 mg Ph, 36667.5 mg DL-Methionine, 200.02 mg Ethoxyquin, 50 mg Flavophospholipol, 30 g fish meal, 1800 g wheat bran

Chicks were vaccinated against the most common diseases such as Newcastle Disease (ND) and Infectious Bronchitis (IB), body weight was determined throughout the feeding periods, feed intake was recorded for the above periods. At the end of the experiment, three chicks from each replicate were randomly selected and weighted to obtain Live Body Weight (LBW). Chicks were slaughtered by means of a sharp knife for complete bleeding and feathers were plucked. Head, internal viscera and shanks were removed. Carcass was left for one hour to remove excess water and allowed for over night cooling at 4±2°C then weighed. Dressing percentage was calculated free from giblets and the included organs were weighted separately as percentage of the carcass weight. Blood samples were taken from the brachial vein using a syringe. Samples were used for the measurement of various hematological parameters including PCV, WBC and RBC count, Hemoglobin (Hb) concentrations and Hetrophile to Lymphocytes ratio (H/L) glucose and cholesterol concentration. Data were analyzed using the General Linear Model Procedure of SAS (1996). Duncan's multiple range tests was used to detect the differences ($p<0.05$) among different group means.

Table 2: Effect of different levels of Hot red pepper (Hrp) on the performance ± standard error on broiler

		Parameters					
		3 weeks			6 weeks		
Treatments		BWG	FC	FCR	BWG	FC	FCR
Control	T_1	794±14.7[c]	1374±24.5[b]	1.73±3.4[b]	2575±41.62[c]	4865±10.51[b]	1.89±0.05[b]
Hrp 0.25%	T_2	816±15.4[b]	1404±19.6[b]	1.72±2.6[b]	2641±38.19[bc]	4795±17.18[c]	1.81±0.09[ab]
Hrp 0.50%	T_3	996±16.7[a]	1673±23.6[a]	1.68±2.9[a]	2722±37.16[b]	4832±18.12[bc]	1.78±0.07[a]
Hrp 0.75%	T_4	1032±12.9[a]	1723±20.8[a]	1.67±3.1[a]	2778±32.14[a]	4885±19.13[b]	1.76±0.06[a]
Hrp 1%	T_5	1071±13.8[a]	1767±24.7[a]	1.65±2.5[a]	2790±29.17[a]	4994±17.26[a]	1.79±0.05[a]

[abc]Means in the same column with no common superscript differ significantly (p<0.05). BWG = Body Wt. Gain (gm), FC = Feed Consumption (g/bird), FCR = Feed Conversion Ratio (gm. Feed/gm. gain)

Table 3: Effect of different levels of Hot red pepper (Hrp) on Hematology mean ± standard error on broiler

		Parameters						
Treatments		Hb (gm/100 ml)	PCV (%)	RBC (10^6/mm^3)	WBC (10^3/mm^3)	H/L ratio	Glucose (gm/100 ml)	Cholesterol (mg/100 ml)
Control	T_1	8.73±0.3[a]	27.3±0.4[a]	3.6±0.03[a]	15.3±0.21[a]	0.44±0.05[a]	148±0.29[a]	138±0.71[a]
Hrp 0.25%	T_2	8.62±0.2[a]	26.9±0.4[a]	3.1±0.02[b]	15.1±0.31[a]	0.41±0.03[b]	133±0.19[b]	131±0.62[a]
Hrp 0.50%	T_3	8.12±0.2[b]	26.6±0.3[a]	3.0±0.01[b]	15.4±0.28[a]	0.40±0.02[bc]	129±0.18[b]	122±0.61[b]
Hrp 0.75%	T_4	7.90±0.4[b]	25.4±0.2[b]	2.9±0.02[bc]	14.8±0.21[a]	0.38±0.01[c]	118±0.16[c]	121±0.54[b]
Hrp 1.00%	T_5	7.45±0.5[c]	24.2±0.4[b]	2.8±0.03[c]	14.6±0.34[a]	0.38±0.02[c]	116±0.27[c]	119±0.41[b]

[a,b,c]Means with different superscripts in the same column differ significantly (p<0.05). Hrp = Hot red pepper

Table 4: Effect of different levels of Hot red pepper (Hrp) on weight of the edible giblet and dressing percent ± standard error on broiler diet

		Traits			
		Edible giblet			
Treatments		Heart (%)	Liver (%)	Gizzard (%)	Dressing percent (%)
Control	T_1	0.67±0.02[a]	2.71±0.19[b]	3.45±0.21[c]	72.02±1.32[b]
Hrp 0.25%	T_2	0.69±0.03[a]	2.93±0.11[a]	3.61±0.27[b]	72.51±1.42[b]
Hrp 0.50%	T_3	0.65±0.02[a]	2.84±0.13[ab]	3.57±0.24[b]	74.16±1.53[a]
Hrp 0.75%	T_4	0.68±0.04[a]	3.10±0.12[a]	3.74±0.19[a]	74.30±0.90[a]
Hrp 1.00%	T_5	0.62±0.05[a]	2.88±0.17[ab]	3.60±0.22[b]	73.28±0.92[a]

[a,b,c]Means with different superscripts in the same column differ significantly (p<0.05). Hrp = Hot red pepper

RESULTS AND DISCUSSION

The effect of different levels of hot read pepper on growth performance (body weight gain, feed consumption and feed conversion ratio) of broiler was presented in Table 2. Results showed significant effects (p<0.05) for chicks fed different levels of hot red pepper for all treatments as compared with control group. These results showed that the inclusion of hot red pepper in the diet improved body weight gain, feed consumption and feed conversion ratio. This improvement obtained with regards to feed consumption and body weight gain are in agreement with what researchers mentioned previously.

Table 3 clears the effect of using different treats of Hrp to the diet on hematological traits for broiler included (PCV%, RBC, WBC, H/L ratio) and glucose (gm/100 ml) and cholesterol (mg/100 ml) traits during experimental period.

Generally results obtained in Table 3 appears a significant difference (p<0.05) between experiment treatments and treatment (1) control, which indicated a dominance of treatment (1) on the above mentioned hematological traits. As compared with experiment treatments, mainly on the treatment (5), which recorded the lowest average of nearly all treatments, which the experiment Treatments should a shift between them. With exceptional of (WBC) trait, that Table 1 showed no significant difference between experiment treatments. It seems that Hrp had no effect or any role on hematological traits indicated above. But the above Table appeared an obvious dominancy for the treatment (1) control in (H/L ratio) as compared with the rest treatments. Lazarevic *et al.* (2000) had indicated the active role of Hrp compounds, specially the active compound (capscicine) rich in vit C that involved in stress hormones structures and this will defense the immune system of birds and enhances diseases resistance through decreasing H/L ratio and that's what Table 3 really showed.

Table 4 showed the effect of different levels of Hrp on the percentages of edible giblets and dressing percentage, the above table revealed no significant difference (p<0.05) between treatments for heart percentage were as the above table generally cleared the dominancy of treatment (4) for edible giblets percentages as compared with the rest of experiment treatments mainly the treatment (1) control, that the above table showed a simple calculated diff. with the result increased the percentage for treatment (4) as compared with the rest treatments which indicates that there is no effect of adding Hrp to the diet on the above mentioned edible giblets percentage.

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